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THE COLOR COMPUTER MONTHLY MAGAZINE

THIRD ANNIVER

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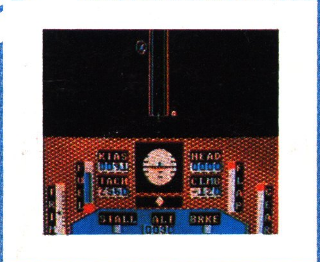

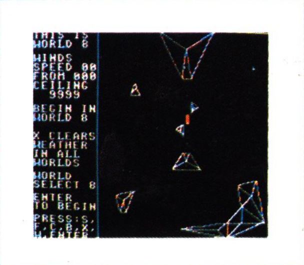

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WINDS
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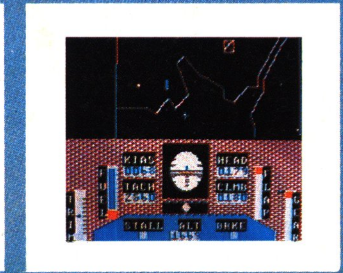

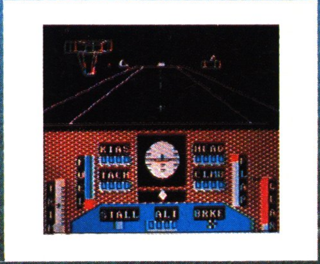

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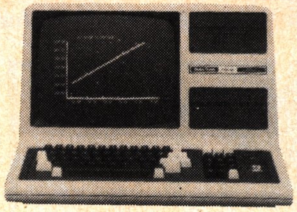

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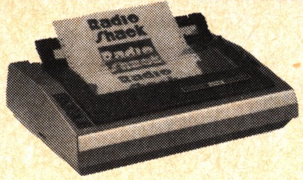

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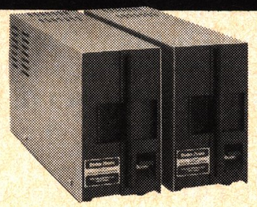

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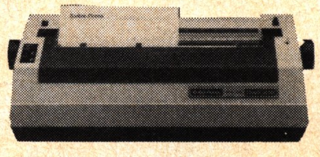

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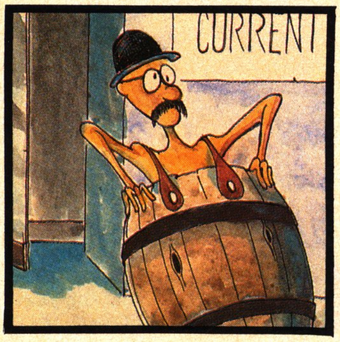
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📼 The small cassette tape symbols beside features and regular columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE, ready to *CLOAD* and *RUN*. For full details, check our RAINBOW ON TAPE ad on Page 223.

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NEXT MONTH: Our games issue! And do we have some goodies, including a whole new genre of game — an arcade-like, joystick-controlled Adventure, a Roy G. Biv Award winner. (Who is he, anyway?) August is the month we begin our new assembly language column for beginners and a special series on "Everything You Always Wanted To Know About CoCo." We'll even have a graphics salute to the Olympics, plus, of course, games, games, games.

As always, there'll be dozens of articles, departments and product reviews — more information on your Color Computer than is available anywhere else.

The RAINBOW

July 1984 Vol. III No. 12

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letters to RAINBOW

ARTS AND LETTERS

HAPPY
ANNIVERSARY

Envelope Of The Month *Eric M. White*
Longwood, FL

IT'S IN COLOR

Editor:

I would like to bring something to everyone's attention concerning books that have been published for the CoCo. I have been in several bookstores now and found that each one consistently misfiles these books. Any book that has "Color Computer" as part of its title without "TRS-80" is apparently thought to be a book covering the general topic of all non-black-and-white computers. I came across this problem while comparing the number of titles available for the different models. It is not uncommon to find as many misfiled as filed CoCo books.

Bookstore personnel have generally been polite, but uninterested. (You know, the old "Aren't they all the same?" look.) At the very least, both CoCo owners and authors should be made aware that several books may seem unavailable or not selling as well as expected because they're misfiled. Publishers should do something about making their distributors aware of where these books should be located. In the meantime, if you're perusing the computer books at your favorite bookstore, make sure to thoroughly search each model's section looking for the key phrase "Color Computer."

D.E. Isom
Marina, CA

HINTS & TIPS

Editor:

After many failures by both Radio Shack in Texas and me to place -upc in the startup file [for OS-9], I received a call from them which seems to do the trick. However, I don't know why. Add this to the startup file: *tmode(space).1 (space)-upc*. So far, no problems have occurred.

Herman R. Isaacs, M.D.
Cincinnati, OH

STOPPING HUNGRY DATA

Editor:

Mike Fahy's "Boltype" (May 1984 RAINBOW Page 64) was very good. I like dot graphics and play around with it a lot. Although the program was written for a 32K CoCo, it will run nicely on a 16K machine. Change Line 40 to: *40 GOTO 1850*. Add 1850: *1850 PCLEAR 2:GOTO 50*.

Dot graphics do not use the graphics pages of memory and as many (or as few, depending on how you look at it) as are necessary can be *PCLEARed*.

Another way of saving memory when using RS printers is to subtract 128 from the sum of each column total in the *DATA* statements, then add it back in the ?#-2 command. Where *C* is the *READ: PRINT #-2, CHR$(C+128);*.

DATA statements eat up memory and it is sometimes necessary to get a little "tricky" with the computer.

Travis Aiton
Azle, TX

Editor:

Those who have upgraded their E version CoCos to 64K might want to know that the mod does not bring these older machines quite completely up to look exactly like the newer A computers. The problem showed up when an associate of mine tried to run Radio Shack's latest diagnostic ROM pack on his upgraded E board and found that the memory portion of the test did not recognize his computer as having 64K (showed to test only 32K). The problem is the E board uses PB7 of PIA U8 to output a test of jumpers for 32/64K, whereas the newer A board uses PB6 of the same PIA (which is called U18 on this board).

A simple cut and add to the RAM size jumpers changing PB7 to be PB6 cures the problem, and the new diagnostic ROM pack will now recognize the upgraded E board as having a full 64K. This is the only condition where I have found this difference to be a problem (Color BASIC sets several of the PB lines, both PB6 and PB7 included, when it tests for memory availability, so it sees no difference between the two revisions). I would like to know if anyone else has found any other variations in functional layout between the two versions.

Richard C. Lawrence
Austin, TX

MAKING THE PROPER CONNECTION

Editor:

Thank you for a fine magazine. I especially like to read the "Letters to RAINBOW" column.

In installing a Deluxe Keyboard from Radio Shack in my 64K CoCo E board, I found that the connector supplied with the adaptor kit, if installed according to the pin markings on it and the main logic board, will cause improper operation. The connector must be installed with the pin numbers reversed and the electronic parts on top. This letter is testimony that this works as it was done on the CoCo in question.

I hope that this bit of information will save some poor soul all the grief I suffered due to trying to install the connector "properly."

By the way, the new keyboard is a vast improvement over the original. Even my wife, who can type 90 wpm, likes it (all she could get out of the old one was 70 wpm).

Thanks again for an outstanding magazine. RAINBOW is far above the rest.

Tom Locke
Beaufort, SC

A CHARMING TIP

Editor:

First, I would like to compliment you on your informative and well-published magazine.

At the time of this writing, I have had my new CoCo 2 for about one week. What a fine computer!

The following has worked extremely well for me. Type in and ENTER *LOAD "FILENAME",R.* Your program will load from disk and *RUN* automatically. You can also use this command in program lines to set up a directory file that will control several selections from one menu.

If you then enter routines in each of these programs to call back a *LOAD* of the main directory program, you will have quite an effective way of working within a group of programs on each disk.

I am presently using this system on several disks controlling numerous programs on each disk, and it works like the proverbial "charm." Keep up the good work RAINBOW!

A.L. Johnson
Georgetown, CO

Editor:

I would like to thank Steve Good for his fine program called *Spooler* which was published in the June 1983 RAINBOW, Page 246. The modifications to enable the program to run on the new 1.1. Disk ROM can be found in Jacques Labonte's letter in the April 1984 issue (Page 8). An important point about this software spooler is that it not only saves time at the keyboard, but also may resolve an incompatibility between the CoCo and the DMP-120, which causes the printer to occasionally drop the first character of a printed line. In my situation, I had written a BASIC program to produce my multiple-choice tests and had employed a *MID-STRING* statement embedded in a *FOR/NEXT* loop to send characters to the printer one at a time. Even with the 1.1 BASIC ROM and the *POKE 151, 255* that Radio Shack suggested, I was getting about one line in six misprinted, but with *Spooler* added to my test-making program my questions have been perfectly readable, if not answerable.

Ted Jaeger, Ph.D.
Fayetteville, NC

A MEMORY FINDER

Editor:

I read Steve Abram's letter in the May 1984 (Page 7) RAINBOW about disabling the Reset key. The jump vector for the Reset key is located in memory locations 114 and 115. That means that whenever the Reset key is pressed the computer will go to a machine language routine whose address is contained in locations 114 and 115. The routine must start with a NOP or the computer will cold-start.

Doug Snyder
Mansfield, CT

CHILLY COCO

Editor:

This is an answer to the letter Marc Labbe wrote in the April 1984 (Page 6) "Letters to RAINBOW."

The cold room should not affect the CoCo at all as long as it doesn't become extremely cold. But the major problem will be humidity. Most cold basements are also very humid due to the fact that cold air does not hold as much moisture as warm air. This makes the moisture condense out on room objects such as walls, which are cooler than the air temperature.

This extra moisture in the air can also rust metal objects. I am talking from experience. Having kept my CoCo downstairs for over a year, I discovered that the metal screws holding together the disk controller had rusted badly inside the controller, but the other components still looked good. I was probably lucky, and I moved my computer back upstairs as soon as I saw the problem.

Steven Ostrom
Minnetonka, MN

CALL TO ASSEMBLY

Editor:

I am the proud owner of a 64K CoCo and have enjoyed your magazine for almost a year. One of my favorite departments has been "Assembly Corner" but I have not seen it recently. I think that you have a tremendous magazine and I hope that you continue your super service.

Bill Melton
Oklahoma City, OK

Editor's Note: Due to other pressing commitments, Dennis Lewandowski is unable to continue his "Assembly Corner" column. We are grateful for his sharing his expertise with us for so long and wish him well. Beginning with our August issue, we will have a new columnist and we have asked him to concentrate on getting started in assembly language.

KUDOS

Editor:

I welcome the type of article published by Tom Nelson, which appeared in your May RAINBOW.

Having recently been initiated to microcomputers and printers, I appreciate and need this type of article, "A Primer on Printers," which explains, in ways not encountered in most factory manuals, the basic, yet

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fundamental mechanisms of printer technology.

I look forward to reading more of Mr. Nelson's articles in future issues, and hope that others with equal knowledge and opportunity will see fit to communicate their skills to newcomers such as I. Keep it simple and comin'.

Richard Dallaire
Ottawa, Ontario

Editor's Note: We like Tom Nelson's writing style, too, Richard. But, like Mr. Lewandowski, Tom has informed us that other commitments preclude his continuing his RAINBOW column. We appreciate Tom's serving a "hitch" as a regular columnist and hope that both Tom and Dennis will appear on these pages again from time to time.

Editor:

Another thousands of kudos: Your solid, broad coverage of the CoCo scene can't be beat, and gets better each issue. I suggest you have a special contest corner for beginner/youngster input to encourage fresh blood. "Letters," "BASIC Training," "Reviews," "Downloads" and "Rainbowtech" are solid regulars; and theme issues is a powerful concept.

RAINBOW is a major resource, so press on!

George Huntley
Ozark, AL

Editor:

Yours [RAINBOW] is still the most exceptional publication I have ever seen for the Color Computer and its owners.

Paul M. Filch, Jr.
APO, NY

Editor:

May I say how much I enjoy your magazine and your attempts to cover equitably all segments of CoCo ownership. I purchased my CoCo 19 months ago because of the good magazine support from THE RAINBOW. Thanks to all those CoCo software suppliers who use your magazine.

J.B. Garner
Halifax, Nova Scotia

CLUBS, CLUBS, CLUBS

Editor:

I am trying to form a Color Computer Club in the Mount Vernon-Evansville, Ind., area. Anyone interested please contact me at (812) 874-2210, Box 462.

Brian Broyles
Poseyville, IN

Editor:

I am interested in joining or forming a Color Computer Club in the Southbury, Conn., area. If you have information about a club or would like to form one, please contact me at 209 Carriage Drive, 06488, or call (203) 264-6357.

Rob Johnson
Southbury, CT

Editor:

I would like to announce the Davis CoCo-Nuts, a Color Computer Club for fourth- to sixth-graders in Davis, Calif. Interested people can contact me at 1818 Haussler Dr., 95616.

Adam Sherman
Davis, CA

Editor:

A new CoCo users group has been formed in West Virginia. The West Virginia Color Computer Club meets the second and fourth Wednesday of each month at 7 p.m. We have a newsletter, a private BBS, "Co-Co-Nut" T-shirts, and members get discounts at some local computer stores. Anyone interested in becoming a member of our Club should contact me at 949 Baier Street, 25177.

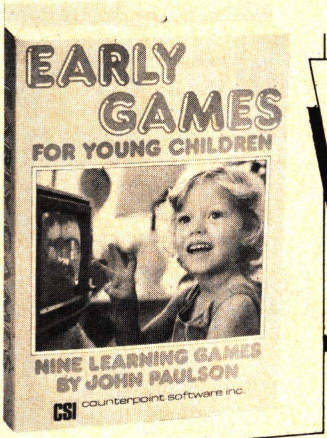
Will Mucklow
St. Albans, WV

Editor:

We are pleased to announce the establishment of the Personal Computer User's Society in the metropolitan city of Barcelona-Puerto La Cruz, Venezuela. This users group seeks to promote interest in computer science, to increase understanding of the uses of personal computers and their application in various activities, to promote relevant research in this field and to establish a communication link between all the members.

At the present time, our society has 42 members including college professors and students as well as technical and professional people. Our members own several brands of computers.

We are planning a monthly newsletter with articles written by our members and translations of magazine articles. We meet every



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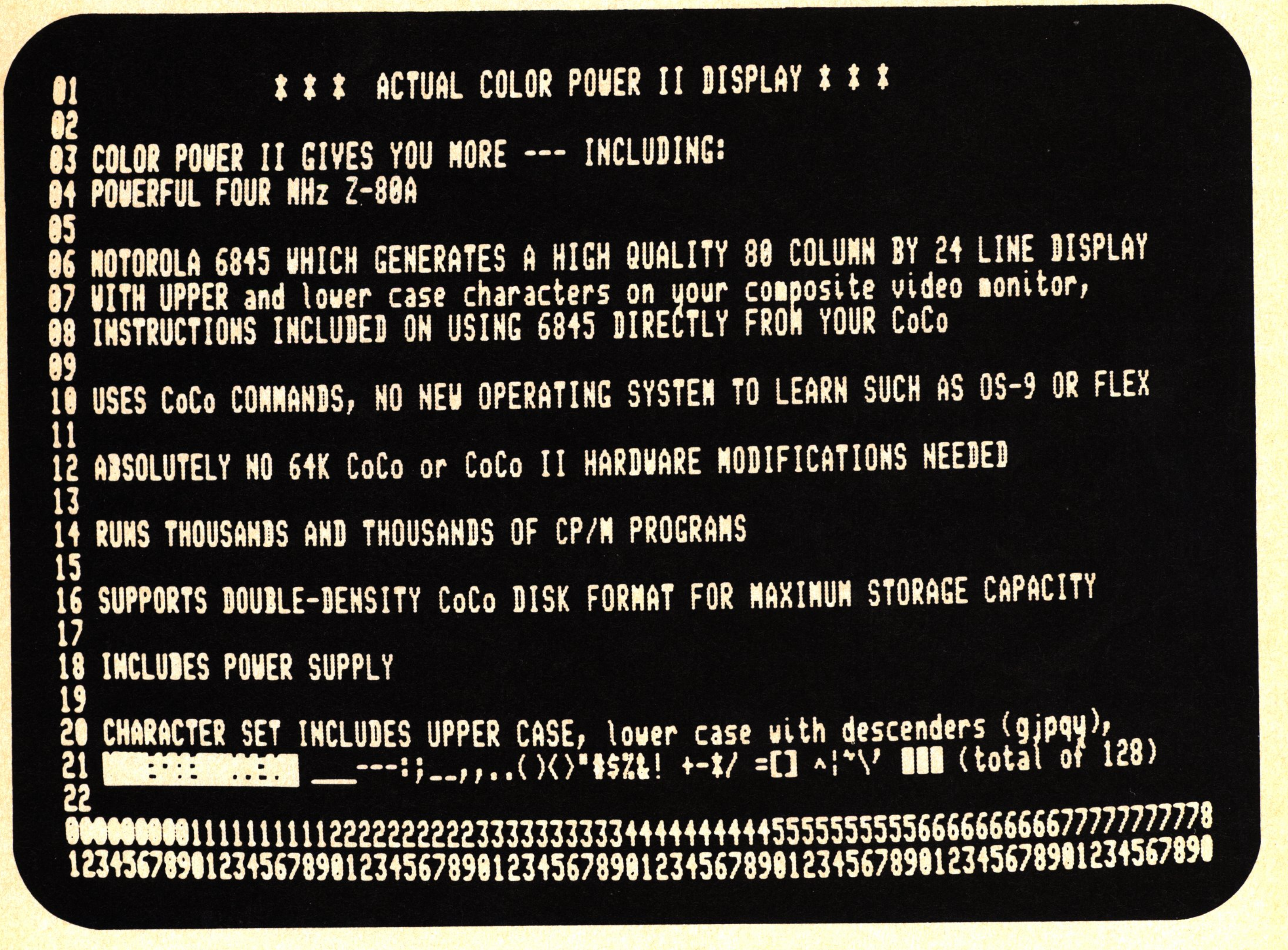
Expands Your CoCo to CP/M



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02
03 COLOR POWER II GIVES YOU MORE --- INCLUDING:
04 POWERFUL FOUR MHz Z-80A
05
06 MOTOROLA 6845 WHICH GENERATES A HIGH QUALITY 80 COLUMN BY 24 LINE DISPLAY
07 WITH UPPER and lower case characters on your composite video monitor,
08 INSTRUCTIONS INCLUDED ON USING 6845 DIRECTLY FROM YOUR CoCo
09
10 USES CoCo COMMANDS, NO NEW OPERATING SYSTEM TO LEARN SUCH AS OS-9 OR FLEX
11
12 ABSOLUTELY NO 64K CoCo or CoCo II HARDWARE MODIFICATIONS NEEDED
13
14 RUNS THOUSANDS AND THOUSANDS OF CP/M PROGRAMS
15
16 SUPPORTS DOUBLE-DENSITY CoCo DISK FORMAT FOR MAXIMUM STORAGE CAPACITY
17
18 INCLUDES POWER SUPPLY
19
20 CHARACTER SET INCLUDES UPPER CASE, lower case with descenders (gjpqy),
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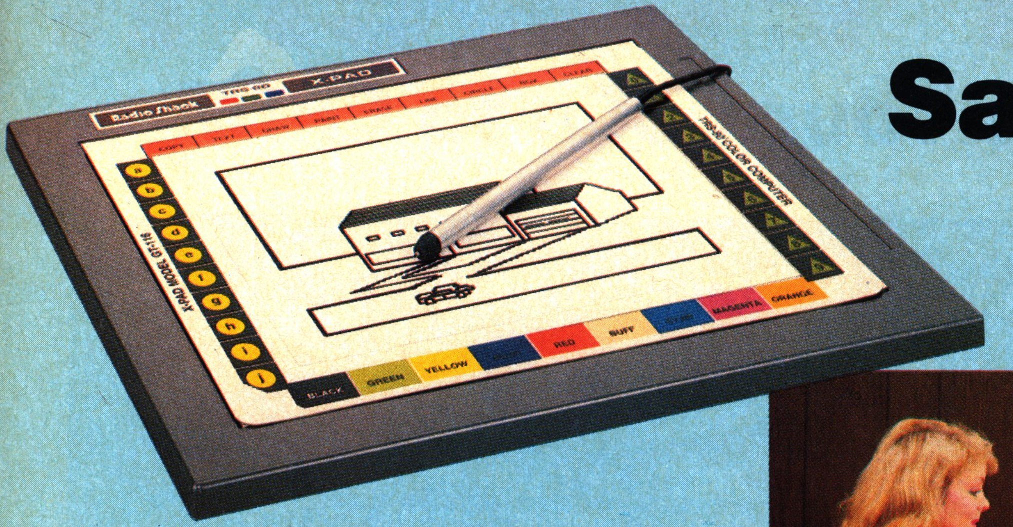

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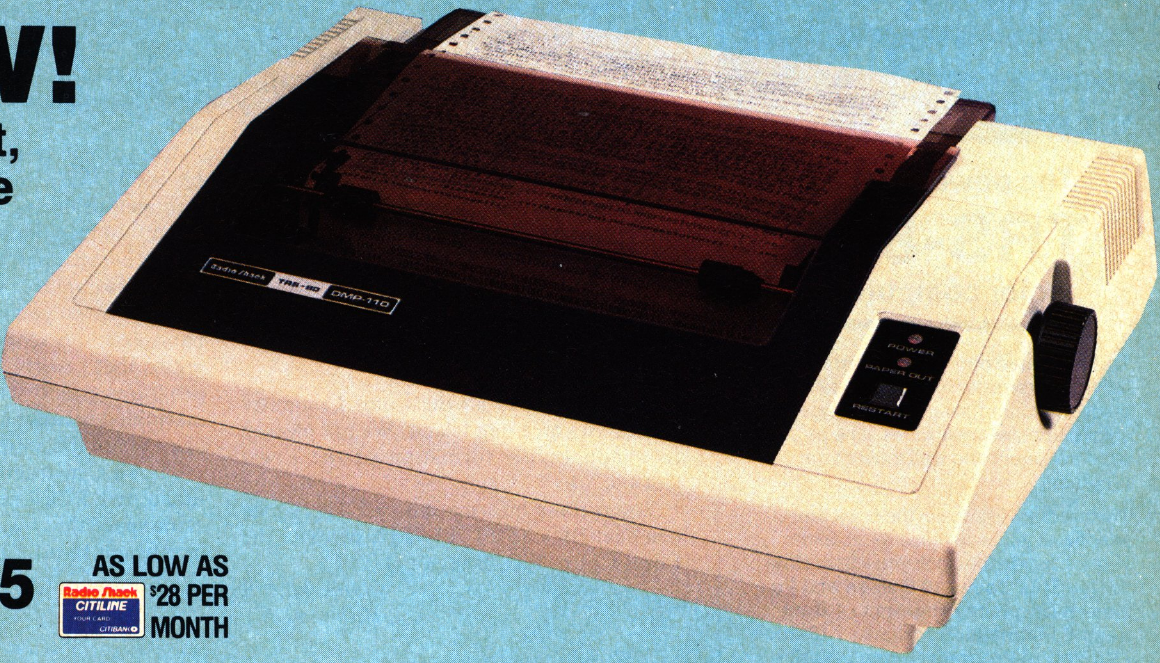

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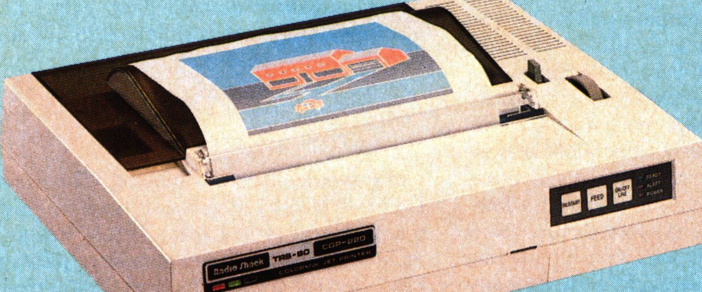
- **Features Color Computer Compatible Serial and Parallel Interfaces**

DMP-110. High-performance printing has never been this affordable! Bit-image graphics mode is perfect for use with the TRS-80 X-Pad, and is compatible with Color Computer screen print routines (26-312, $9.95). The high-resolution mode features 960 dot-addressable, 16-dot columns for detailed pictures and charts. Print impressive-looking reports with proportionally-spaced or correspondence-quality characters at up to 25 cps. Use super, subscripts and underlines. Prints standard, elite or condensed characters for easy-to-read program listings. Use single sheets or fanfold paper. 26-1271



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CGP-220. A super quiet, drop-on-demand graphics/text printer! Screen print utility (26-3121) provides spectacular Color Computer displays. Prints 2600 dots/second in graphics mode with a resolution of 560 dots/line in one color and 640 dots/line in multi-color mode. 26-1268

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The structure of each program contains the program type, objective, background, summary, graphic explanation, program structure, taking it further, and suggested hints to expand to other applications.

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Osvaldo Briceno, President
Barcelona, Venezuela

Editor:

I am forming a CoCo Club in the Indianapolis-Noblesville area. Anyone interested, please write to me at 310 Appletree Dr., 46060 or call (317) 842-1340.

Erik Merz
Noblesville, IN

Editor:

I'd like to announce a Color Computer Club (6809'ers) in the western Massachusetts area. We meet once a month. Anyone interested please contact me at (413) 732-6633 or write to: 93 Grockmal Ave., 01151.

Paris Nepus
Springfield, MA

Editor:

This letter is to all the Color Computer enthusiasts on Long Island. We are pleased to announce the formation of the Local CoCo Club.

For further information call The Color Channel BBS, (516) 783-7582, or write the Local CoCo, P.O. Box 901, 11710.

Chuck Martin
Bellmore, NY

BOUQUETS & BRICKBATS

Editor:

I would like to publicly thank Software Support, Inc., for their honesty and responsiveness in handling my disk drive order and the ROM change that was needed on it. "SUPPORT" is, in fact, their middle name. I hope all CoCo product companies follow their example.

Robert Shepard
Versailles, KY

Editor:

I recently ordered a program tape called *Custom Flashcards* from one of your advertisers, Creative Technical Consultants. After it arrived, I found that it took two or three tries to get past an I/O Error and get it loaded. I wrote the company and within two weeks I received a new *Custom Flashcards* tape, along with a 50 percent discount coupon "by way of apology for any inconvenience the defective tape may have caused" me. The new tape works fine and the program is just great. I used the coupon to order another one of their programs called *Alphabet Soup*, and it worked perfectly too. (Now if I can just get the kids to quit playing *Alphabet Soup* long enough for me to study my *Flashcards* . . .). Anyway, it's great to deal with a company that cares about their product and my "inconvenience."

J.W. Abel
Denver, CO

HAND ASSEMBLY

Editor:

Several months ago, THE RAINBOW altered the manner in which it published programs written in assembly language. What you see published in the magazine is not the actual complete listing. [This is because THE RAINBOW uses a short utility written by Mr. Schrag to delete the lengthy FCC instructions which add little information, but take up valuable magazine space.]

This omitting of portions of the listing does not affect Color Computerists who type the program in using an editor/assembler.

Unfortunately, readers who "hand assemble" or *POKE* assembly language programs into memory using short BASIC drivers will often find that the program does not work. This is because part of the program has been cut out to conserve magazine space.

My point to you is this: If you are using a hand-assembly scheme, avoid keying in programs that involve FCC statements. These programs usually will not work when hand-assembled because what you see in the magazine is not the entire program.

The FCC instruction's output is an unfortunate evil. FCC lines take up so much magazine space that it simply is not economical or efficient to print the entire listing.

Roger Schrag
Los Angeles, CA

BULLETIN BOARD SYSTEMS

Editor:

I would like to announce the operation of a BBS in the Montreal region, Color 80 #7. It has been in operation for a year and is open to all. It is run on a 64K CoCo and the software is a slightly modified version of the Silicon Rainbow Products board. The operating hours are from 11 p.m. to 6 a.m. Montreal time, seven days a week. The phone number is (514) 658-3087.

Pierre Berthiaume
Chambly, P.Q.

Editor:

I would like to announce a new BBS called Color Pacific Bulletin Board, which is totally dedicated to the TRS-80 CoCo. It supports uploading, downloading, games and graphics. Readers may call the BBS anytime at (604) 738-2773.

Debbie Cooper
Vancouver, B.C.

Editor:

We would like to announce *Time-Link* Color-80 BBS #77, operating from 6 p.m. to 6 a.m. everyday in Layton, Utah. Features include uploading, downloading, message base, electronic shopping, text files, and pictures. Give us a call at (801) 544-3423.

Sheldon Malone
Layton, UT

Editor:

We are pleased to announce the Northwest Data Bulletin Board. It features E-Mail, upload, download, online games, club sections and an electronic joke book!

Hours are from 6 p.m. to 6 a.m. daily. The number is (509) 489-5133.

Terry Thompson
Spokane, WA

Give up on Word Processors for Fast Letter Writing & Mailing Labels

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DATABASE/MAILER 64 & LETTER WRITER 64

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- Active menus guide you to valid operations.
- 16K system allows 11 to 82 records per file.
- 32K system allows 66 to 440 records per file.
- 64K system allows 91 to 610 records per file.
- 4 – 10 fields, 5 – 27 field widths, 20 – 270 char/record.
- All user definable with default values – simple.
- Sort any field alpha/numeric, full or partial.
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- Up to 9 line labels with up to 500 copies each.
- Master two column printout with field names.
- Master printout includes date, paging & filename.
- Selective printing by any field or field range.
- Accepts alpha or numeric zip codes up to 10 digits.
- Partial or whole item search by any chosen field.
- Single screen 10 record display by any field.
- Single key entry for hard copy of screen data.

- Fast single page letter writing with wordwrap.
- Embedded commands center, tab and line skip.
- Full screen edit allows delete, insert & change.
- Headings and closings are tabbed, spaced and printed – all automatically.
- No "Database Adventure" – over 40 page manual.
- Manual includes program operation flowcharts.
- Not needed, but included is user modification section.
- Access up to 4 drives in disk version.

— FEATURES —

FILE MANAGER 64
A utility program custom designed for DATABASE/MAILER files only
(16K, 32K, 64K, Tape or Disk)

- Create new files from all or part of old file.
- Auto select "special" records for saving to new file.
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- Auto copy identical data to all records in file.
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PRINT #-2,

This month's issue of THE RAINBOW marks our third anniversary issue. And what an issue it is! We have something a little special that will, we hope, bring a new dimension to your CoCo — a Scratch And Sniff Adventure.

I feel sure we're the first computer publication ever to use the popular Scratch And Sniff technology. As most of you know, youngsters really like these things. So, we thought we'd take the Scratch And Sniff concept and apply it to something CoCo could use.

As with anything we do, we would really appreciate your reaction to the Scratch And Sniff Adventure. It is something I've been wanting to do for almost a year now and, despite the fact that it is a little "off the wall," I think (and hope) you will be interested in playing the Scratch And Sniff Adventure.

One of the reasons I have been interested in Scratch And Sniff is based on something my old sixth grade teacher told me one time. Her name was Helen Dierking and one of the things Mrs. Dierking was really interested in doing was teaching younger children how to write in a creative manner.

So, Mrs. Dierking encouraged us to write stories and other things. And she gave us a lot of helpful tips along the way. One of them was that the more senses we were able to appeal to, the more successful our writing would be.

As an example, Mrs. Dierking told us it was good literary style to characterize the sun as a "tangy yellow lemon hanging in a sea-blue sky" than to just say "the sun shone in the sky." The "tangy lemon" gave the reader an image relating to the sense of taste; "sea-blue" made you smell the salt air.

So, while we have been considering the Scratch And Sniff Adventure for about six months, the concept was really born a few decades ago in North Glendale School in St. Louis, Mo. I think that by combining the sense of smell (from the Scratch And Sniff), the sense of sight from your CoCo screen and the "sense" of imagination that inflicts every Adventurer, we may just have a winning idea. I do hope you'll like our Third Anniversary present to you.

There's another "present" in these pages, too. A full three-year index to THE RAINBOW. It amazes me to see that there are over 1,500 articles indexed and more than 700 products reviewed! By the way, there are extra copies of the index available at $2.50 each, plus 50 cents for postage and handling — just in case you want a separate copy or don't want to cut THE RAINBOW up.

I suppose you mix a little good with the bad. *Chromasette* Magazine and Dave Lagerquist were among the first members of the CoCo Community; one of the driving forces in the early days of the Color Computer. *Chromasette*, I am sad to report, is no more — a victim of changing times and other forces in the marketplace. But there is some good news, too. All *Chromasette* subscribers will have their subscriptions fulfilled by our tape service, RAINBOW ON TAPE. For every issue of *Chromasette* that was due, each subscriber will get an issue of RAINBOW ON TAPE.

What is important about this is not that RAINBOW ON TAPE grows to a total monthly subscription number of something close to 8,000, but the character of Dave Lagerquist. Because his firm is bankrupt, Dave could easily have not bothered with seeking a way to compensate his subscribers. Instead, he chose the more difficult road and worked hard to make this work for everyone. Dave Lagerquist exemplifies many of the ideals of the CoCo Community.

And, of course, we welcome all our new RAINBOW ON TAPE subscribers to our tape service — which has been praised as the best available.

An anniversary — or birthday, if you will — is really a special occasion. And, one of the special things about it is the ability to share it with the thousands of you. This year's anniversary is especially meaningful, because it also marks the birthday year of THE RAINBOW's first "in-family" birth.

Gracing the spot where my picture usually appears with CoCo is "our" first baby, Lauren Shuck. She's the daughter of Donna and Bill Shuck, and we — or, at least some of us, call her the "Rainbowette." Donna is our assistant general manager for finance and the picture was taken one day when Donna and the Rainbowette came by for a visit.

I suppose there will be other "children" in our family — especially since three of our staff plan marriages in the next six months or so — but Lauren is the first. Happy *birthday* to her.

(continued on Page 175)

Telewriter-64™
the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
- **True lower case characters**
- **User-friendly full-screen editor**
- **Right justification**
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- **Drives any printer**
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- **Runs in 16K, 32K, or 64K**
- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

> *...one of the best programs for the Color Computer I have seen...*
> — Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

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File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

> *...truly a state of the art word processor... outstanding in every respect.*
> — The RAINBOW, Jan. 1982

PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs $49.95 on cassette, $59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

To order, send check or money order to:

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BUILDING JULY'S RAINBOW

Our Third Anniversary Edition . . . With Happy Birthday Presents . . . And, Some Statistical Fun . . .

You know how writers often try to conceptualize massive numbers, such as "If the $94 billion Federal deficit were a stack of one dollar bills, it would reach all the way to Neptune." Well, I toyed around a bit with some RAINBOW statistics, and surprised even myself. For instance, if the *LLISTings* in the past year's RAINBOW were printed out on one continuous fan-fold sheet, you could attach it to the big toe of the Statue of Liberty, wrap it around her seven or eight times, touch it to the tip of the torch, and there would still be enough left over to reach the ground again! Along the same line, if all of last year's articles were linked in one continuous half-page wide column, our usual format, it would reach all the way to the top of the Eiffel Tower and back down to earth.

Well, if you're a new reader and don't know about the origins of our homemade magazine, which began three years ago this month as a four-page newsletter (two 8½ x 11 sheets of paper, photocopied on both sides), perhaps you don't fully appreciate how proud we are on the occasion of RAINBOW's third birthday. But do give us a moment to strut a bit; after all, it is our birthday.

In keeping with the birthday spirit, we have a couple of special presents, one in a light-hearted vein, and the other all business. The first has been kept under wraps; the other is in response to high demand. I know it's a breach of etiquette ("tacky," is the term we use in these parts), to leave the price tag on gifts, but they both cost a bundle so, as we've all heard our parents say, take care of them and don't lose them.

I feel I'm on solid ground in saying that never before in the history of humankind has there been an Olfactory Computer Adventure. Yes, our first present is a Scratch And Sniff Adventure Game. Off the wall? Yep. As I recall, the idea was born in a staff meeting as a facetious comment, but ideas belong to those who nurture them and, in this case, that person is Lonnie Falk, RAINBOW editor and publisher, a man with a pungent sense of humor and the offbeat. He's been as excited as a coon hound on a fresh line ever since. I never thought he'd convert me, but he did. It takes some getting used to, but it is a fun game, once the "hokey" wears off. So, roll your eyes into the back of your head as Eric Tilenius did when we gave him four whole weeks to write the Original Odoriferous Adventure, but then give *The Arconiax Assignment* a whirl, . . . er whiff.

The Arconiax Assignment has complete listings for both 16K and 32K users because we want as many people as possible to be able to try this breakthrough in technological eccentricity. Toward that same end, I want to announce that RAINBOW ON TAPE programs are now available on CompuServe. While the CompuServe *Softex* section fee of $3.50 per program might seem high compared to getting two dozen or more programs on a given month's RAINBOW ON TAPE for just $8, we're talking about instant gratification: If you have THE RAINBOW in hand and want to order a given program and have it *delivered right over the telephone, ready to run just minutes later*. CompuServe's *Softex* is your answer. We think it's an important new service for our readers. By the time you read this, programs from March through July 1984 issues of THE RAINBOW should be ready for downloading.

Our "serious present" is a complete index to the first three years of THE RAINBOW, 16 pages of fine print, 1,528 articles painstakingly indexed and cross-referenced into one comprehensive compilation by Leslie Foster. It's reproduced in its entirety in this issue but, if you want extra copies, they're available in a stiff cover for $2.50 plus 50 cents postage and handling per order. We hope it's helpful. Certainly, we've had many requests for such an index.

In this anniversary issue, we're pleased to introduce a brand new columnist, Dan Eastham, of DEFT Systems, whose "Personable PASCAL" column is a welcome addition to RAINBOWtech. Also, our Second Annual Simulation Contest is under way with a deadline of Sept. 1. The official announcement, sample Simulations and a tutorial appear in this issue as well as our usual blend of something for everyone. Finally, ending as we began, with a statistical "picture," there will be enough copies sold of this third birthday issue to make two stacks of magazines, both higher than the Empire State Building. That's a tall monthly serving, but we'll gladly add your name in short order to our "carry out" subscription list. To receive more than 2.25 million words — not even including advertising — this coming year, just give us the word.

— Jim Reed

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Cooking With CoCo

PART I

In which we gather together the ingredients and utensils and explore the possibilities of CoCo's Disk Operating System.

By Colin J. Stearman

I know I do not need to tell you that CoCo is a powerful computer. You have probably spent as much time as I arguing its merits over those "fruity" and "big blue" machines. So while we are in agreement thus far, you'll surely also agree that even the "best" can be improved.

In this series of articles over the next few months we will explore how to incorporate many improvements, some of which are often only found on systems costing 10 times as much. I hasten to add that these improvements will be completely incorporated into the operating system and will be there when you want them. There have been other articles detailing enhancements, but they always involve loading programs into memory and they never seem to be there when you need them. Not so with the enhancements we are going to cook up here!

What exactly are we going to enhance and what is it going to take to do it? These articles are aimed at the standard 32K Disk CoCo system running with version 1.1 of Color BASIC, 1.0 of Extended Color BASIC and 1.0 of Disk Extended Color BASIC. The earlier 1.0 version of Color BASIC will probably work also, but the 1.1 version of Disk BASIC will not without modifying the programs presented here.

(Colin J. Stearman is an electronics engineer educated in the U.K. He has worked with all kinds of computers and has been a CoCo enthusiast for over two years.)

Although I will give you every assistance, it is going to take some skill on your part. Even the best written recipe requires the cook to add his skill. Some of the enhancements require hardware construction and some electronic construction skills. Others will involve the assembly of machine language programs. But none of it is really difficult and if you have a 64K system you can have almost all of the enhancements without even lifting a screwdriver.

Required Utensils

If you're going to attempt the hardware projects, you will need the normal set of screwdrivers, pliers, cutters and a soldering iron. If you are about to embark on a "hardware hacking" career, your local Radio Shack can accommodate you.

The assembly language programs will require an assembler. *EDTASM+* will do the job, but I much prefer *MAC* from Computerware. This is what I use and I will attempt to point out the differences when necessary. For typing in the scource code, a good editor is a must.

The Glossy Photo

Every good cookery book has glossy photos of the finished dish to whet your appetite. Our photo is by way of a list of the more tasty features:

*FAST and SLOW to control CoCo's clock speed
*XEQM to load and execute a machine code program
*DATE$ to return a string containing the date
*Directory pause
*File creation date in the directory
*Confirmation of the Kill request
*WPEEK/WPOKE 16-bit word *PEEK* and *POKE*
*Error trapping in BASIC programs
*Error code, error line and error name functions
*Auto execution of a BASIC file on start-up
**AUTO* line numbering, with start line and increment
*Flexible keyboard entry (FLEXIKEY)
*Fully spelled-out error messages
*SCAN$, "INKEY$" with built-in wait for key press
*40-track versions of *DSKINI, BACKUP* and *DSKI$/ DSKO$*
*Fixes to the *FILES* and *PCLEAR* bugs
*Up to *PCLEAR 16* allowed
**BAUD* command to set Baud rate
*Parallel printer port
**LDIR* to send the directory to the printer
*And more . . .

By now your mouth should be thoroughly watering so let's start cooking!

Underlying Principles

When Microsoft wrote the BASIC operating system for Radio Shack they planned ahead and left numerous "hooks" in the code to allow modifications and changes. These hooks take the form of jump instructions located in the lower RAM (random access memory) area of the map. Many of the useful subroutines in BASIC first jump to these hooks, making it very easy to intercept their function and modify or completely change.

Fortunately for us, when Microsoft was contracted to write Disk Extended Color BASIC (DECB), something odd happened. Color BASIC (CB) and Extended Color BASIC (ECB) fully occupied their 8K ROMs (read only memory). But DECB did not come close to filling the 8K. In fact, some 2000 or so bytes were unused. Maybe money or time ran out, but this available space can be put to good use for all those added functions mentioned earlier. The only requirement is to come up with a way to permanently insert the new instructions in this available place.

There are two ways to do this. We can either replace the ROM with a similar EPROM (Eraseable Programmable ROM) containing our additional code, or we can make use of the 64K RAM capability of our CoCo (if we have it). The EPROM approach requires the design of an EPROM programmer and that will be the subject for next month. But the 64K method requires no hardware and does nearly as good a job, so for the remainder of this installment I'll detail what I mean.

Disk Resident DOS

If you have installed 64K memory chips and the now famous "Frank Hogg Modification," you know that CoCo can run in an "all RAM" mode in which the three BASIC ROMs play no part. Using this technique it is possible to store the entire BASIC operating system on a specially prepared disk and then boot it into the all RAM system and start it up. In fact, for many computers (the IBM PC, for example) this is the only way of loading the DOS (disk operating system) and is the normal procedure for getting things started at turn on.

If we give CoCo the ability to boot or load its DOS from disk, there is nothing to say that we cannot modify the contents as we desire. As a result we can have the original DOS in the internal ROMs and our enhanced DOS on a special "system disk."

I said this approach is nearly as good as "burning" EPROMs with the modified code. There are some limitations. If you press the Reset button while running the disk-resident DOS, you will be summarily returned to the ROM version. Also, if you run some application programs which make use of CoCo's 64K capabilities, you will probably be returned to the ROM DOS when you exit them. But disk-resident DOS (let's call it DRDOS) can be booted and running in about 10 seconds, so this is not much of a penalty. Further, there are not just 2,000 or so bytes available for enhancements, but using all the address space from $D7DD to $FFEF, there are some 10,000 bytes. This is because we are not limited to the 8K increments and socket space of the ROMs.

Two machine code programs are needed here — one to get DRDOS saved onto disk and the other to retrieve it and start it up. The first I called *SYSSAVE* and the second *SYSTEM*. As a result, the currently running DOS, modified as desired, can be saved to disk by *SYSSAVE* and recovered by *SYSTEM*.

Running BASIC In RAM

BASIC cannot run in a 64K RAM environment without two slight modifications. When it goes through its start-up procedure it switches back to the regular RAM/ROM configuration and we would rather it did not. Second, it goes through a sizing procedure to find out exactly how much RAM is available (remember the days of 4K and 16K?). This testing plays havoc in the 64K RAM mode and must be removed. We already know that BASIC has 32K to work with, so we can skip the testing and report this number immediately. This savings in bytes provides just the room we need to fix the first problem.

So, the first thing we must do is copy an image of BASIC from the three ROMs into the RAM, slightly modify it and then start it up. This is done by a program called *BASLOAD*, shown in Listing 1. This is entirely a BASIC program, but it does load a simple machine code routine and the source for this I have included as REM statements at the end. The program is singularly anticlimatic! After a few seconds a tone sounds and the start-up credits are issued. Nothing seems to have changed. But, in fact, you are in a 64K RAM environment. Don't believe me? Try *POKE&HE000,55* and then *PRINT PEEK (&HE000).* You'll get the 55 back because RAM is at $E000. In the ROM system you will POKE to no avail.

By the way, I'll be using the assembler convention throughout these articles which says that a "$" in front of a number says it's hexadecimal; a "%" means binary and nothing in front means it's decimal. But in BASIC statements I will use "$H" to signify hexadecimal.

Type in the program in Listing 1, save it to a convenient disk and then run it. If you get the tone and new credits everything ran fine and we're ready to save the slightly modified system to a disk. To make absolutely sure your RAM version is okay, type *POKE113,0:EXEC$HA027.* This will do a cold start of the BASIC in RAM and should clear the screen and display the credits. After you're sure it works, get back to the ROM version by typing *POKE113,0* and then pressing Reset. I'll hang around here till you get back!

Saving DOS To Disk

The currently running operating system is saved to disk with a program called *SYSSAVE.BIN.* Once the assembler has created the binary file it is just run by the *LOADM* and *EXEC* commands.

SYSSAVE will request which drive (0 or 1) you wish to save the system to. This drive should contain a blank, formatted disk. The program will then save the contents of memory from $8000 where ECB starts, up to $FF00. This is one more than the highest useable memory. From here to $FFFF are system addresses and vectors. It does not matter whether you have anything in the saved range, it just stores what is there on the disk. As DECB starts at $C000 we could extend it up to $FFEF and be able to run the system in RAM. (That would be a lot of capability, as all the enhancements I listed earlier will fit into the 8K space allotted to the DECB ROM from $C000 to $DFFF.

The bytes are stored on disk on tracks 0 through 6, plus the first sector of track 7. This means that granules 0 through 14 are used an unavailable to BASIC. The granule map on track 17 sector 2 is modified to reflect this. Therefore, once a system has been saved to a new disk, the *FREE* function will return a value of 53, even though the directory shows no files.

Sector 1 on track 17 is not used by BASIC, so the first byte is set to $55 to indicate that this is a system disk. When *SYSSAVE* is run it first checks that this $55 is there. If it is, then a system can safely be stored on the disk. If not, then this disk has never had a system saved on it before. In this case, *SYSSAVE* checks that the first 15 granules are free. If so, the system can be saved. If not, a "DISK NOT FREE FOR SYSTEM STORAGE" message is returned and *SYSSAVE* gives up. As a result it should not be possible for *SYSSAVE* to overwrite valuable data on a disk.

To run *SYSSAVE* it must first be entered as shown in Listing 2 and then assembled. If you're using *EDTASM+*, leave out the lines with mnemonics "NAM" and "OPT" in them; these are just directives to my *MAC* assembler. This will be true for all future assembly language programs. Another mnemonic *MAC* has which must be converted for *EDTASM+* is the FCS instruction. This forms a constant string and allows embedded hexadecimal control codes and automatically adds a terminating zero byte. So the line in *SYSSAVE* which I have as:

```
FCS / <0D>DRIVE NUMBER (0 OR 1) ? /
```

would become:

```
FCB $0D A CARRIAGE RETURN
FCC / DRIVE NUMBER (0 OR 1) ? /
FCB 0 TERMINATING ZERO
```

You can convert all other FCS instructions into these groupings and *EDTASM+* will like them just fine.

When the code assembles correctly and you have checked it carefully, the only thing left is to try and run it! The best technique is to first load and run *BASLOAD.* This gets the system running in RAM and suitably modified for this environment. Now *LOADM"SYSSAVE"* but don't execute it yet. Then remove all important disks from all your drives as chaos may be about to reign. Load a blank, formatted disk in drive 0 and type in *EXEC.*

> *"If you're going to attempt the hardware projects, you will need the normal set of screwdrivers, pliers, cutters and a soldering iron. If you are about to embark on a 'hardware hacking' career, your local Radio Shack can accommodate you."*

The screen will clear and a request will appear asking which drive to save to. Enter a zero. Drive 0 should whir for a few moments and the OK prompt appear. If not, it's back to the editor and look for that inevitable typo!

The system has now been saved to disk. A couple of checks will help confirm this. Type in *PRINT FREE(0)* and a value of 53 should be returned. Another check would be to type the following commands:

```
CLEAR 500
DSKI$ 0,17,1,A$,B$
PRINT HEX$(ASC(A$))
```

This last line should print the value 55. But the ultimate test is to try to retrieve and run the saved system.

Booting From Disk

If you study the code of *SYSTEM* you will find it very similar to *SYSSAVE,* and it is hardly surprising. Type in and assemble the program in Listing 3. When you've thoroughly checked it for typing errors and are certain it is right, put a write-protect tab on your system disk anyway. Then when the impossible happens, your saved system won't be erased.

Now *LOADM* the binary file called *SYSTEM,* remove the disk and place the system disk in drive 0. *SYSTEM* always boots from drive 0. Then *EXEC* the program. Once again the screen will clear and a message will announce what is happening. Drive 0 will run and you will hear the head moving. When it is finished you will be requested to input which "flavor" of BASIC you want, CB, ECB or DECB. Pressing the appropriate letter will cold start that version. This feature is a convenient way of disabling DECB should you want to run one of the other configurations.

If everything worked as expected, you can copy the *SYSSAVE* and *SYSTEM* source and machine code files to your system disk. Then they will all be in the right place. I also wrote a simple BASIC program to start up *SYSTEM* which you might want to include. Then, if you call it BASIC you can just type *RUN BASIC.* It is:

```
10 'DISK OPERATING SYSTEM LOADER
20 LOADM"SYSTEM"
30 EXEC
```

To remove the system from a system disk and make the full 68 granules available, the simplest way is to reformat with the *DSKINI* command. Don't have anything else valuable on the disk though, as it will be erased.

Wrapping It Up

You now have the first tool to be used later in the DOS enhancements. When these have been installed and saved to a system disk, they can be booted at power-up and all the features will be there without absorbing any RAM space. Even if you intend taking the EPROM route, it's still a good idea to have these programs as it makes testing quicker and easier.

Which brings me to next month. Putting the enhanced version of the DOS in an EPROM is certainly a nice way to go. Then everything is there just as soon as the power is turned on. So, next month we will start the EPROM programmer. This is a very simple hardware project using only three chips! Most of the work is done by the software. So, if you've ever had a soldering iron in your hand, give it a try.

Throughout this series I will be happy to try to answer related questions which might arise. Please address them to me at 143 Ash Street, Hopkinton, Mass. 01748 and enclose a S.A.S.E. Be as precise as you can and give me a few weeks to get back to you. You can also send me EMAIL on CompuServe to 71036,256.

See you next month!

Listing 1

```
SYSSAVE                              COMPUTERWARE MACRO ASSEMBLER
COOKING WITH COCO PART 1/LISTING 2 (C)1984 COLIN J. STEARMAN

                 OPT   NOG,LIS
         *
         * THIS LOADS BASIC FROM $8000
         * UP TO $FF00 ONTO A BLANK
         * FORMATTED DISK. IT USES
         *THE FIRST 15 GRANULES.
         * 14 gran * 9 sectors * 256 bytes = 32256
         * plus
         * 1 sector = 32512 byte which cover from
         * $8000 to $FF00. All of accessible upper
         * memory
         *
         ****************************
         *SOME EQUATES
```

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```
C002            0018 RETURN EQU   $C002
8000            0019 BASIC  EQU   $8000
C004            0020 DSKCON EQU   $C004
C006            0021 DCOPC  EQU   $C006
A002            0022 CHROUT EQU   $A002
A000            0023 POLCAT EQU   $A000
A928            0024 CLEAR  EQU   $A928         DIRECT JUMP TO CLEAR ROUTINE
                0025 *
0E00            0026        ORG   $E00
                0027 *
0E00 7F0F17     0028 SYSSAV CLR   TRACK         RESET TRACK POINTER
0E03 7F0F18     0029        CLR   SECTOR        CLEAR SECTOR POINTER
0E06 7C0F18     0030        INC   SECTOR        SET T0 1
                0031 *
0E09 BDA928     0032        JSR   CLEAR         CLEAR SCREEN
0E0C 308D0209   0033        LEAX  TITLE.PCR     LOAD TITLE MESSAGE POINTER INTO X
0E10 1700E3     0034        LBSR  DISPLY        DISPLAY IT
                0035 *
0E13 308D0224   0036 ASKDNO LEAX  DRIVNO.PCR    ASK FOR DRIVE NUMBER
0E17 1700DC     0037        LBSR  DISPLY
0E1A AD9FA000   0038 REPET  JSR   [POLCAT]      GET DRIVE NUMBER
0E1E 27FA       0039        BEQ   REPET
0E20 AD9FA002   0040        JSR   [CHROUT]      ECHO ENTRY
0E24 8130       0041        CMPA  #'0           IS IT LOWER THAN ASCII ZERO?
0E26 25EB       0042        BLO   ASKDNO        YES
0E28 8131       0043        CMPA  #'1           IS IT HIGHER THAN ASCII 1?
0E2A 22E7       0044        BHI   ASKDNO        YES
0E2C 10BEC006   0045        LDY   DCOPC         POINT Y AT PARAMETERS
0E30 8030       0046        SUBA  #'0           REDUCE TO A NUMBER
0E32 A721       0047        STA   1,Y           SELECT DRIVE
                0048 *
                0049 *
                0050 *GET SECTOR1 TRACK17 TO SEE IF
                0051 *THIS WAS A SYSTEM DISK
0E34 8611       0052        LDA   #17           TRACK
0E36 A722       0053        STA   2,Y
0E38 8601       0054        LDA   #1            SECTOR
0E3A A723       0055        STA   3,Y
0E3C CC0F19     0056        LDD   #BUFFER
0E3F ED24       0057        STD   4,Y
0E41 8602       0058        LDA   #2            READ CODE
0E43 A7A4       0059        STA   ,Y
0E45 AD9FC004   0060        JSR   [DSKCON]
0E49 6D26       0061        TST   6,Y           ERRORS?
0E4B 10260091   0062        LBNE  ERRORS
0E4F F60F19     0063        LDB   BUFFER        TEST FOR $55
                0064 *GET EXISTING DISK MAP INTO BUFFER
                0065 *
0E52 1700A6     0066        LBSR  GETMAP
0E55 6D26       0067        TST   6,Y           ANY ERRORS
0E57 10260085   0068        LBNE  ERRORS
0E5B C155       0069        CMPB  #$55
0E5D 2605       0070        BNE   NEWSYS
0E5F 8E0F28     0071        LDX   #BUFFER+15
0E62 200E       0072        BRA   OUTMAP
                0073 *
                0074 *CHECK FOR 255 IN FIRST 15 BYTES
                0075 *IF NOT ALL 255 THEN DISK NOT AVAILABLE.
                0076 *
0E64 8E0F19     0077 NEWSYS LDX   #BUFFER       POINT X TO BUFFER
0E67 A680       0078 NXTBYT LDA   ,X+           GET BYTE
0E69 81FF       0079        CMPA  #$FF          IS IT 255?
0E6B 267A       0080        BNE   NOTAV         OUTPUT NOT AVAILABLE MESSAGE
0E6D 8C0F28     0081        CMPX  #BUFFER+15    DONE ALL 15?
0E70 25F5       0082        BLO   NXTBYT
                0083 *
                0084 *SET UP MAP AND WRITE OUT
                0085 *
0E72 86C6       0086 OUTMAP LDA   #$C6          LAST GRANULE POINTER
0E74 A782       0087        STA   ,-X
0E76 860F       0088        LDA   #15           15 AT 14 ETC.
0E78 4A         0089 DONEXT DECA
0E79 A782       0090        STA   ,-X
0E7B 8C0F19     0091        CMPX  #BUFFER       DONE ALL 15?
0E7E 22F8       0092        BHI   DONEXT
                0093 *
                0094 *PUT IT ONTO DISK
0E80 17007E     0095        LBSR  PUTMAP
0E83 6D26       0096        TST   6,Y           ANY ERRORS?
0E85 10260057   0097        LBNE  ERRORS
                0098 *****
                0099 *MARK DISK AS A SYSTEM DISK BY
                0100 *SETTING BYTE1 IN SECTOR 1 TO $55 IN TRACK 17
0E89 8601       0101        LDA   #1            SECTOR
0E8B A723       0102        STA   3,Y
                0103 *SET UP DRIVE OP CODE
0E8D 8655       0104        LDA   #$55          MARKER
0E8F B70F19     0105        STA   BUFFER
0E92 AD9FC004   0106        JSR   [DSKCON]
0E96 6D26       0107        TST   6,Y
0E98 2646       0108        BNE   ERRORS
                0109 *********
0E9A 8603       0110        LDA   #3            WRITE CODE
0E9C A7A4       0111        STA   ,Y
                0112 *POINT X AT START OF BASIC
0E9E 8E8000     0113        LDX   #BASIC
                0114 *
                0115 * START TRANSFER
                0116 *
0EA1 B60F17     0117 NXTSCT LDA   TRACK         GET TRACK NUMBER
0EA4 A722       0118        STA   2,Y
0EA6 B60F18     0119        LDA   SECTOR        GET SECTOR NUMBER
0EA9 A723       0120        STA   3,Y
0EAB AF24       0121        STX   4,Y           BUFFER ADDRESS
                0122 *
0EAD AD9FC004   0123        JSR   [DSKCON]      WRITE BLOCK
0EB1 6D26       0124        TST   6,Y           CHECK FOR ERRORS
0EB3 262B       0125        BNE   ERRORS        REPORT THEM
                0126 *
                0127 *INCREMENT VALUES
0EB5 30890100   0128        LEAX  256,X         MOVE BUFFER POINTER
0EB9 B60F17     0129        LDA   TRACK         IS IT LAST TRACK?
0EBC 8106       0130        CMPA  #6
0EBE 2509       0131        BLO   NOTLST
```

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★FREE★ CATALOG

```
                0132 *WE GOT HERE BECAUSE THIS IS THE LAST TRACK(7)
0EC0 B60F18     0133        LDA   SECTOR
0EC3 8102       0134        CMPA  #2          LAST SECTOR IN TRACK 6
0EC5 2727       0135        BEQ   CLOSE
0EC7 2007       0136        BRA   INCMT       GO TO INCREMENT
                0137 *
0EC9 B60F18     0138 NOTLST LDA   SECTOR
0ECC 8112       0139        CMPA  #18
0ECE 2705       0140        BEQ   NXTTRK
                0141 *GET HERE BECAUSE NOT ALL SECTORS DONE YET
0ED0 7C0F18     0142 INCMT  INC   SECTOR
0ED3 20CC       0143        BRA   NXTSCT      DO NEXT SECTOR
                0144 *
                0145 *GOT HERE BECAUSE LAST SECTOR
0ED5 7F0F18     0146 NXTTRK CLR   SECTOR
0ED8 7C0F18     0147        INC   SECTOR
0EDB 7C0F17     0148        INC   TRACK
0EDE 20C1       0149        BRA   NXTSCT
                0150 *****************
0EE0 308D0170   0151 ERRORS LEAX  ERR,PCR
0EE4 8D10       0152        BSR   DISPLY
0EE6 39         0153        RTS
                0154 *****************
0EE7 308D017D   0155 NOTAV  LEAX  NTAV,PCR
0EEB 8D09       0156        BSR   DISPLY
0EED 39         0157        RTS
                0158 *****************
0EEE 7FFF40     0159 CLOSE  CLR   $FF40       TURN OFF MOTOR
0EF1 39         0160        RTS
                0161 *****************
                0162 *
0EF2 AD9FA002   0163 DISPL1 JSR   [CHROUT]    DISPLAY ON SCREEN
0EF6 A680       0164 DISPLY LDA   ,X+         GET CHARACTER
0EF8 26F8       0165        BNE   DISPL1
0EFA 39         0166        RTS
                0167 *
0EFB 8602       0168 GETMAP LDA   #2          READ OP CODE
0EFD A7A4       0169 STORE  STA   ,Y
0EFF 2004       0170        BRA   CONT
0F01 8603       0171 PUTMAP LDA   #3          WRITE OPCODE
0F03 20F8       0172        BRA   STORE
0F05 8611       0173 CONT   LDA   #17         SELECT TRACK
0F07 A722       0174        STA   2,Y
0F09 8602       0175        LDA   #2          SELECT SECTOR
0F0B A723       0176        STA   3,Y
0F0D 8E0F19     0177        LDX   #BUFFER     BUFFER ADDRESSS
0F10 AF24       0178        STX   4,Y
0F12 AD9FC004   0179        JSR   [DSKCON]
0F16 39         0180        RTS
                0181 **********************
                0182 *
                0183 * VARIABLES AND STRINGS
0F17            0184 TRACK  RMB   1
0F18            0185 SECTOR RMB   1
0F19            0186 BUFFER RMB   256
1019 20         0187 TITLE  FCS   / BASIC TO DISK<0D> STORAGE PROGRAM<0D><0D>/
103B 0D         0188 DRIVNO FCS   /<0D>DRIVE NUMBER (0 OR 1)? /
1054 0D         0189 ERR    FCS   *<0D><0D>READ/WRITE ERROR<0D>*
1068 0D         0190 NTAV   FCS   /<0D>DISK NOT FREE FOR SYSTEM STORAGE<0D>/
                0191 *
0E00            0192        END   SYSSAV
       NO ERROR(S) DETECTED


   SYMBOL TABLE:

ASKDNO 0E13     BASIC  8000     BUFFER 0F19     CHROUT A002
CLEAR  A928     CLOSE  0EEE     CONT   0F05     DCOPC  C006
DISPL1 0EF2     DISPLY 0EF6     DONEXT 0E78     DRIVNO 103B
DSKCON C004     ERR    1054     ERRORS 0EE0     GETMAP 0EFB
INCMT  0ED0     NARG   0000     NEWSYS 0E64     NOTAV  0EE7
NOTLST 0EC9     NTAV   1068     NXTBYT 0E67     NXTSCT 0EA1
NXTTRK 0ED5     OUTMAP 0E72     POLCAT A000     PUTMAP 0F01
REPET  0E1A     RETURN C002     SECTOR 0F18     STORE  0EFD
SYSSAV 0E00     TITLE  1019     TRACK  0F17

CMD=SYSSAVE /P
```

Listing 2

```
SYSTEM                               COMPUTERWARE MACRO ASSEMBLER  PAGE 1
COOKING WITH COCO PART 1/LISTING 3 (C)1984 COLIN J. STEARMAN


                  0004        OPT   NOG,LIS
                  0005 *
                  0006 *THIS WILL LOAD A SYSTEM DISK
                  0007 *IN DRIVE 0 INTO 64K RAM AND
                  0008 *START IT UP
                  0009 *THE SYSTEM SHOULD HAVE BEEN SAVED
                  0010 *BY "SYSSAVE" AND OCCUPY THE FIRST 15
                  0011 *GRANULES ON THE DISK. A FLAG IN THE
                  0012 *FIRST BYTE OF TRACK 17 SECTOR 1 TELLS
                  0013 *IF THE DISK CONTAINS A SYSTEM
                  0014 *THIS WILL RESTORE FROM $8000 TO $FF00
                  0015 *****************************
                  0016 *
                  0017 *
0E00              0018        ORG   $E00
                  0019 *
                  0020 *SOME EQUATES
A002              0021 CHROUT EQU   $A002
A000              0022 POLCAT EQU   $A000
8000              0023 BASIC  EQU   $8000
C004              0024 DSKCON EQU   $C004
C006              0025 DCOPC  EQU   $C006
A928              0026 CLEAR  EQU   $A928       DIRECT JUMP TO CLEAR ROUTINE
FFDE              0027 ROM    EQU   $FFDE
FFDF              0028 RAM    EQU   $FFDF
```

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```
A027            0029 COLD   EQU   $A027
                0030 *
                0031 *SET UP FOR DRIVE 0
0E00 10BEC006   0032 SYSTEM LDY   DCOPC
0E04 6F21       0033        CLR   1,Y          DRIVE NUMBER
                0034 *
                0035 *CLEAR SCREEN
0E06 BDA928     0036        JSR   CLEAR
                0037 *
                0038 *PUT UP TITLE
0E09 BE100D     0039        LDX   #TITLE
0E0C 170060     0040        LBSR  DISPLY
                0041 *
                0042 *
                0043 *CHECK FOR SYSTEM DISK
0E0F 8D3D       0044        BSR   SYSCHK
                0045 *RETURN "A" AS $55 IF SYSTEM DISK
0E11 8155       0046        CMPA  #$55
0E13 2707       0047        BEQ   DISKOK
0E15 8E0FEE     0048        LDX   #NOSYS       POINT X TO NO SYSTEM DISK MESSAGE
0E18 160054     0049        LBRA  DISPLY       OUTPUT IT
0E1B 39         0050        RTS
                0051 *
0E1C 8D56       0052 DISKOK BSR   GETSYS
                0053 *
0E1E 7FFF40     0054        CLR   $FF40        TURN OFF DRIVE
0E21 B7FFDF     0055        STA   RAM          SWITCH TO RAM
0E24 0F71       0056        CLR   $71          CLEAR TO COLD START
                0057 *ASK FOR WHICH SYSTEM TO BOOT
0E26 8E1022     0058        LDX   #BOOT
0E29 170043     0059        LBSR  DISPLY
0E2C AD9FA000   0060 POLAGN JSR   [POLCAT]     GET RESPONSE
0E30 27FA       0061        BEQ   POLAGN       NONE YET?
0E32 8142       0062        CMPA  #'B          IS IT BASIC?
0E34 2606       0063        BNE   EORD
0E36 7F8000     0064        CLR   $8000        SET UP COLOR BASIC
0E39 7EA027     0065        JMP   COLD         GO TO IT
0E3C 8145       0066 EORD   CMPA  #'E          IS IT EXTENDED BASIC
0E3E 2606       0067        BNE   ISITD
0E40 7FC000     0068        CLR   $C000        SET UP FOR EXTENDED BASIC
0E43 7EA027     0069        JMP   COLD         GO TO IT
0E46 8144       0070 ISITD  CMPA  #'D
0E48 102791DB   0071        LBEQ  COLD         GO TO DISK BASIC
0E4C 20DE       0072        BRA   POLAGN
                0073 ****************************
                0074 *SYSTEM DISK CHECK
0E4E 8611       0075 SYSCHK LDA   #17          TRACK
0E50 A722       0076        STA   2,Y
0E52 8601       0077        LDA   #1           SECTOR
0E54 A723       0078        STA   3,Y
0E56 CC0ED8     0079        LDD   #BUFFER
0E59 ED24       0080        STD   4,Y
0E5B 8602       0081        LDA   #2           READ OPCODE
0E5D A7A4       0082        STA   ,Y
0E5F AD9FC004   0083        JSR   [DSKCON]
0E63 6D26       0084        TST   6,Y
0E65 2653       0085        BNE   ERRORS
                0086 *SEE IF FIRST BYTE IS $55
0E67 B60ED8     0087        LDA   BUFFER
0E6A 39         0088        RTS
                0089 **************************
                0090 *DISPLAY ROUTINE
0E6B AD9FA002   0091 DISPL1 JSR   [CHROUT]
0E6F A680       0092 DISPLY LDA   ,X+
0E71 26F8       0093        BNE   DISPL1
0E73 39         0094        RTS
                0095 **************************
                0096 * SYSTEM LOAD ROUTINE
0E74 8E8000     0097 GETSYS LDX   #BASIC       POINT X AS START OF BASIC
                0098 *SET UP DRIVE
0E77 7F0FD8     0099        CLR   TRACK
0E7A 7F0FD9     0100        CLR   SECTOR
0E7D 7C0FD9     0101        INC   SECTOR       TO SECTOR 1
                0102
                0103 *
0E80 B60FD8     0104 DOTFR  LDA   TRACK        SET UP TRACK
0E83 A722       0105        STA   2,Y
0E85 B60FD9     0106        LDA   SECTOR       SET TO SECTOR
0E88 A723       0107        STA   3,Y
                0108 *READ SECTOR
0E8A AD9FC004   0109        JSR   [DSKCON]
0E8E 6D26       0110        TST   6,Y
0E90 2628       0111        BNE   ERRORS
                0112 *
                0113 *MOVE BUFFER INTO RAM AREA
0E92 8D2C       0114        BSR   BUFMOV
                0115 *
                0116 *INCREMENT VALUES
0E94 B60FD8     0117        LDA   TRACK        IS IT LAST TRACK?
0E97 8106       0118        CMPA  #6           HIGHEST FULL TRACK
0E99 2508       0119        BLO   NOTLST
                0120 *WE GOT HERE BECAUSE THIS IS ON TRACK 7
0E9B B60FD9     0121        LDA   SECTOR       LAST SECTOR
0E9E 8102       0122        CMPA  #2           ONLY NEED ONE SECTOR ON TRACK 7
0EA0 2608       0123        BNE   INCMT        GO TO INCREMENT
0EA2 39         0124        RTS
                0125 *
0EA3 B60FD9     0126 NOTLST LDA   SECTOR       LAST SECTOR IN OTHER TRACKS?
0EA6 8112       0127        CMPA  #18
0EA8 2705       0128        BEQ   NXTTRK
                0129 *
                0130 *GOT HERE BECAUSE NOT ALL SECTORS READ YET
0EAA 7C0FD9     0131 INCMT  INC   SECTOR
0EAD 20D1       0132        BRA   DOTFR        CONTINUE TRANSFER
                0133 *
                0134 *GOT HERE BECAUSE LAST SECTOR
0EAF 7F0FD9     0135 NXTTRK CLR   SECTOR
0EB2 7C0FD9     0136        INC   SECTOR
0EB5 7C0FD8     0137        INC   TRACK
0EB8 20C6       0138        BRA   DOTFR        CONTINUE TRANSFER
                0139 ***********
0EBA 8E0FDA     0140 ERRORS LDX   #ERR
0EBD 8DB0       0141        BSR   DISPLY
0EBF 39         0142        RTS
                0143 ***********
                0144 * THIS MOVES 256 BYTES FROM BUFFER
                0145 *TO LOCATION POINTED TO BY REG X
0EC0 CE0ED8     0146 BUFMOV LDU   #BUFFER      POINT U TO BUFFER
0EC3 1A50       0147        ORCC  #$50         DISABLE INTERRUPTS
0EC5 B7FFDF     0148        STA   RAM          SWITCH TO RAM
0EC8 A6C0       0149 STORE  LDA   ,U+          GET BYTE AND INCR U
0ECA A780       0150        STA   ,X+          STORE & INCR X
0ECC 11830FD8   0151        CMPU  #BUFFER+256 ALL DONE
0ED0 26F6       0152        BNE   STORE        CONTINUE MOVING
0ED2 B7FFDE     0153        STA   ROM          SWITCH BACK TO ROM
0ED5 1CAF       0154        ANDCC #$AF         ENABLE INTERUPTS
0ED7 39         0155        RTS
                0156 **********************
                0157 *STORAGE
0ED8            0158 BUFFER RMB   256
0FD8            0159 TRACK  RMB   1
0FD9            0160 SECTOR RMB   1
0FDA 0D         0161 ERR    FCS   *<0D>READ/WRITE ERROR<0D><0D>*
0FEE 0D         0162 NOSYS  FCS   /<0D>NO SYSTEM ON DISK IN DRIVE 0<0D>/
100D 20         0163 TITLE  FCS   / DISK BASIC LOADER<0D><0D>/
1022 42         0164 BOOT   FCS   /BASIC, EXTENDED OR DISK(B,E,D)?/
                0165 *
0E00            0166        END   SYSTEM
        NO ERROR(S) DETECTED


   SYMBOL TABLE:

BASIC  8000     BOOT   1022     BUFFER 0ED8     BUFMOV 0EC0
CHROUT A002     CLEAR  A928     COLD   A027     DCOPC  C006
DISKOK 0E1C     DISPL1 0E6B     DISPLY 0E6F     DOTFR  0E80
DSKCON C004     EORD   0E3C     ERR    0FDA     ERRORS 0EBA
GETSYS 0E74     INCMT  0EAA     ISITD  0E46     NARG   0000
NOSYS  0FEE     NOTLST 0EA3     NXTTRK 0EAF     POLAGN 0E2C
POLCAT A000     RAM    FFDF     ROM    FFDE     SECTOR 0FD9

STORE  0EC8     SYSCHK 0E4E     SYSTEM 0E00     TITLE  100D
TRACK  0FD8

CMD=SYSTEM /P
```

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Modulation	Frequency shift-keyed (FSK)		
Line Interface	Direct-connect		
Data Interface	RS-232C compatible, built-in cable to computer		
Transmit Frequency		ORIG	ANSW
	MARK	1270 Hz	2225 Hz
	SPACE	1070 Hz	2025 Hz
Transmit Frequency Accuracy	± 0.01%		
Transmit Level	-12 dBm typical		
Receive Frequency		ORIG	ANSW
	MARK	2225 Hz	1270 Hz
	SPACE	2025 Hz	1070 Hz
Receive Frequency Tolerance	± 0.5%		
Carrier Detect Threshold	-44 dBm typical		
Carrier Detect Indicator	Audible tone		
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Landlord is a 16K non-Extended BASIC game for two or more players. Its distant cousin is Monopoly, but I think you'll find that with so many changes, it is now a unique game.

Each player begins *Landlord* with $10,000. You will invest this money by buying properties and building apartment complexes. By collecting rent from other players unfortunate enough to land on those properties, you try to gather enough wealth to win the game. There are actually two ways to win this game; by forcing all the other players to go bankrupt, or by reaching a money limit in cash and assets. The money limit is set by the players before the game begins.

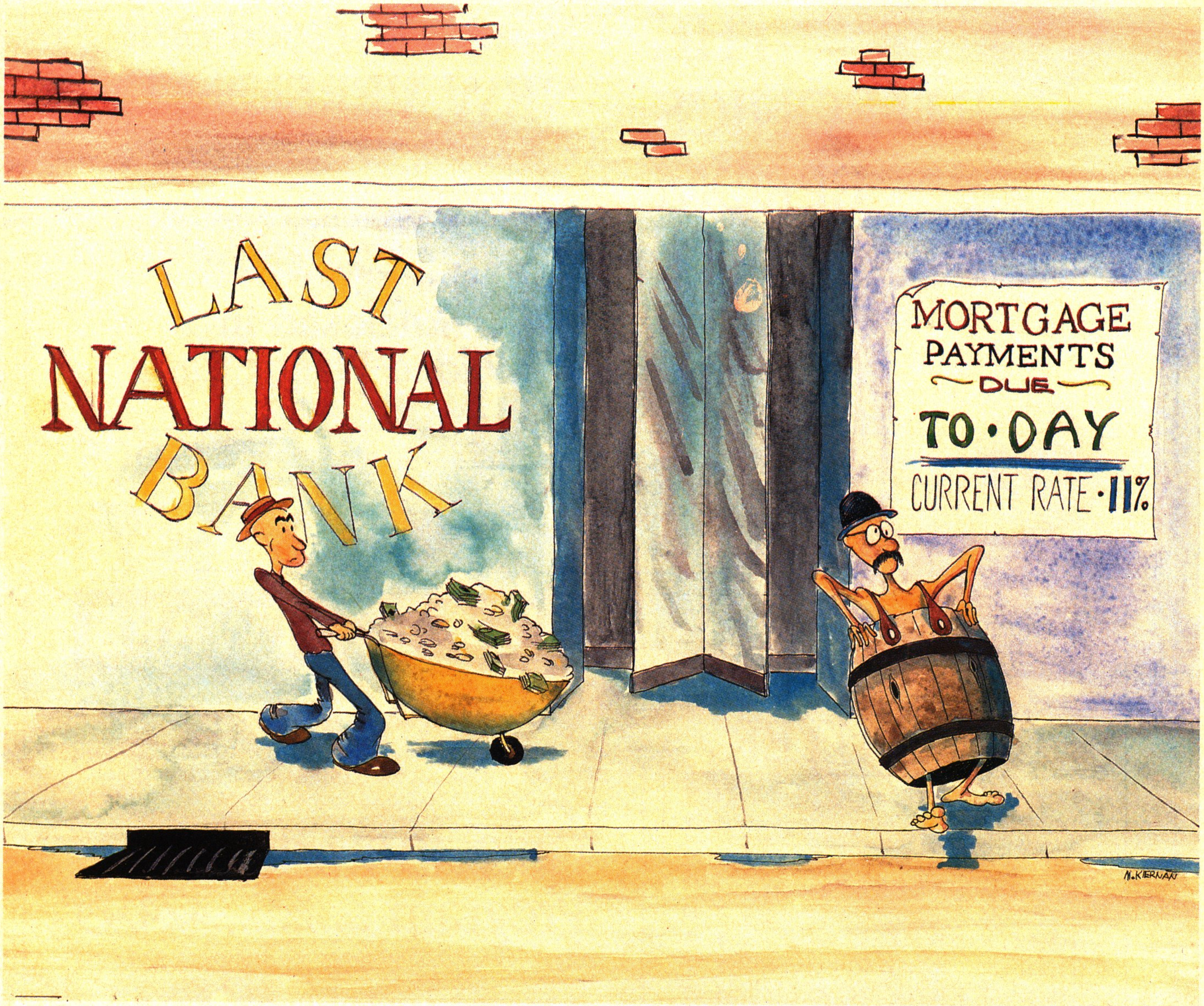
If you'll look at Figure 1, you'll see the "board" used by the computer during the game. The computer will keep track of everything and will keep each player informed, so the board is not actually used or even needed. It's shown here to give you a mental picture of the game for a few turns until you get the hang of the game. The lot prices shown are the beginning prices only and are subject to change during the game.

Before the game begins, you will need to tell the computer the players' names. Next, you will be asked to put in the money limit that each player is playing for. Since each player starts the game with $10,000, the limit should be higher than that; a $35,000 limit makes about a two-hour game, $50,000 is about four to five hours of wheeling and dealing!

Everyone begins the game on payday and movement is clockwise around the board. At the beginning of each player's turn, his die roll is rapidly changing at the bottom of the screen.

The computer stops by hitting a number key, and if the number the player hits matches the number the computer was on at the time, the player receives an extra $1,000 paycheck. Next, the computer will tell the player where he has landed, cash level, etc.

Good News and Bad News squares are just what they say they are. Beware



of the Income Tax square; landing there will cost you 10 percent of your cash on hand.

Your CoCo will be the Bank and it will also keep track of each player's position on the board, his properties and holdings, cash, rolling the dice, issuing paychecks to the players (for passing payday), and, of course, making sure everyone plays by the rules.

As the Bank, CoCo can do two important things. The Bank can loan money to the players. A player can borrow money whenever he wants. Of course, there are some catches! A player may only borrow up to his credit limit, which is a percentage of his assets (less any existing loans he already has). The more property you own, the more credit you have. As you might have guessed, the Bank charges interest on its loans. That interest rate depends on the Economic Index at the time. Every so often there will be a "news flash" announcing the new Economic Index and the new interest rate on loans. (Interest rates will never go below five percent, but there is no upper limit!) A player taking out a loan has his loan balance spread out over 10 equal payments. A payment will be taken out of the player's cash each time he passes on or lands on the Loan Payment Due square. A player has the option to make additional payments whenever he wants to, but they only reduce the number of payments, not the payment amount. It's a good idea to keep enough cash on hand to make your loan payments. Otherwise, you might have to go to the In-The-Hole square.

The In-The-Hole square is something like Monopoly's In Jail square, however it really doesn't come into play until a player tries to end his turn with a negative cash balance. If

---

(Gene Meador does accounts payable for Ryder Truck Rental. He enjoys adapting board and war games to play on his CoCo and would like to hear from others working on similar projects.)

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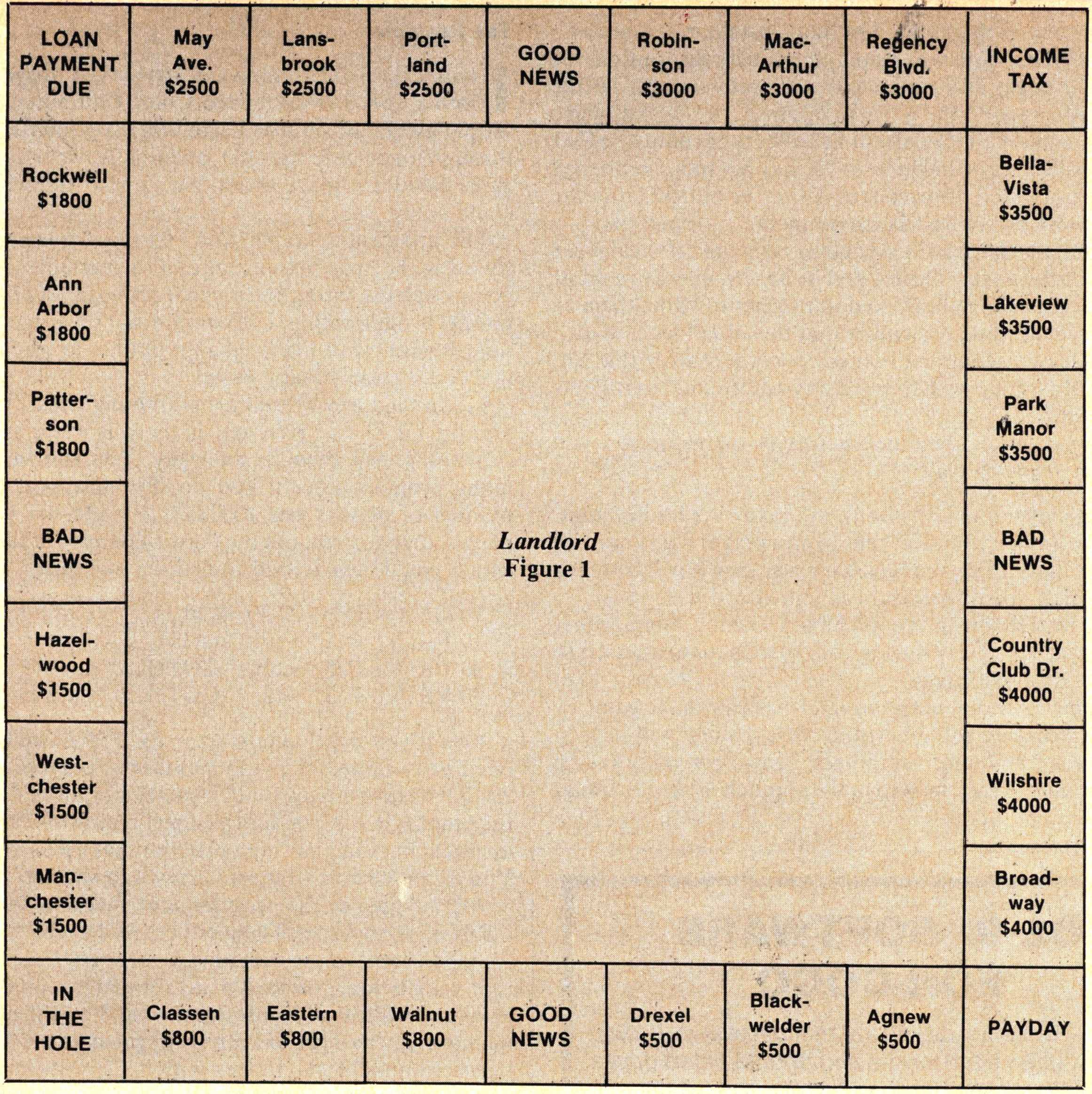

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PAYDAY

Landlord
Figure 1

that happens, the player is given the following options: 1) get a loan from the Bank; 2) sell some property to another player; 3) go to the In-The-Hole square; 4) repossession of some of his properties by the Bank; and 5) quit the game.

If a player decides to go to the In-The-Hole, he may stay there for no more than three turns. If he still has a negative cash balance on his third turn, the option to stay there is deleted and the player has the other four options. In other words, once you go to the In-The-Hole square, the only way off of it is to get a positive cash balance within three turns or quit the game. (Paying $50 won't save you in this game!)

Payday is, as mentioned earlier, the square all the players start the game on. Each time a player lands on or passes payday, he receives a paycheck from the Bank for 10 percent of the value of his holdings or $2,000, whichever is higher.

All the other squares on the board are the Lots of the Landlord. They are spaced evenly around the board in eight groups of three lots each. A player must land on a lot in order to buy it from the Bank. If he wishes to do so, he need only use the "Buy" option and the computer will handle the transaction for him. The "Recap" option is very handy. It gives you a complete rundown of your cash, position on the board, loan balances and payments left, credit limit, a complete rundown of all the properties, who owns them, and the number of apartments on each lot.

As you might have guessed, you must own all three lots of a group before you may build any apartment complexes on them. You may put up to 50 apartments on each lot. Each apartment will cost you 10 percent of the current lot price to build, which is quite a sizable investment for 50! Except for paychecks, and an occasional Good News once in a while, the rent collected from the other players who land on these improved lots will be your only income! Bare lots don't collect any rent. (The actual rent collecting is taken care of for you by the computer as its first order of business each turn.) Tenants are moving in and out of these apartments constantly, so the exact amount of rent that a player will receive depends on how many apartments on that lot are occupied at the time. (Don't worry, at least 60 percent will be.) In other words, just because a player has, say, 10 apartments on a lot doesn't mean that he will collect the rent for all 10 apartments each time someone lands on them. (Is nothing sacred in this game?)

When a player is In-The-Hole, the Bank has the ability to repossess a player's properties. (There is no mortgaging lot or apartments in this game. The Bank just takes possession.) Here's what happens when a player chooses that option: the Bank will begin at Payday and go clockwise around the board repossessing the player's holdings, lot by lot, while giving him one-half the current value for them until he either has a positive cash balance or he has no more property! Those repossessed properties may then be bought from the Bank by any player who lands on them.

Apartments, once built, can never be taken off that lot for the rest of the game. The lot and its apartments are sold or traded as a package deal, so don't forget to value them as such. Buyers should remember that they don't have to own all the lots of a group in order to collect rent from that lot, but they do if they wish to build any additional apartments on that lot.

Let me mention some fine points of the game and you should be ready to play:

1) If a player quits, the Bank will take over his holdings.
2) The Bank will collect rent from a player if you land on one of its improved lots. You may then buy it from the Bank if you'd like (and can still afford it!).
3) As protection to the players, you can't buy another player's property during your turn, but he can sell it to you during his turn.
4) Remember that even though you can win the game by bankrupting the other players, someone will usually win by reaching the money limit first. The key to winning this game is to make as much money as fast as possible.

The Program

I had several objectives when I wrote this program: to fit it into a 16K non-Extended Color Computer, write it as simply as I could so that beginning programmers could go through it and understand it, and finally, write some kind of game besides a space shoot-'em-up that the whole family could enjoy.

The program is simple; don't let the size intimidate you. By using the program outline and the variables list you can go through the listing and see that it's just a lot of *IF-THEN-GOTO* programming. I've compressed the program lines to save memory, but I've used a lot of lines to spread it out so you could understand it easier.

I didn't use any special programming tricks, but there is one tip I'd like to pass on: if there is more than one of something, put them in an array. You can save yourself many program lines if you do. For instance, if P is the number of players and *P1$, P2$, P3$*, etc. are the player's names, then to print out the player's names for turn identification you'd have to add something like this:

```
10 ON P GOTO 20,30,40,50
20 PRINT P1$;"'s turn":GOTO__
30 PRINT P2$;"'s turn":GOTO__
40 PRINT P3$;"'s turn":GOTO__
```

Now if you put that into an array, *P$( )*, you'll only need one line to take care of any number of players: *10 PRINT P$(X); "'s turn"*. Now that's a pretty simplistic example but the point is that if you find yourself typing in several almost identical lines in your next program, take a close look at it. You might be able to use an array and shorten it.

After typing in the program and checking for mistakes, *CSAVE* it to tape. Then either *PCLEAR 0* or *POKE 25,6:NEW* and reload the game. Use the *POKE* or *PCLEAR* each time before you load it. As the game goes on, all those arrays get filled with information and you'll need all the memory you can get to keep from getting an OM? Error.

After hours of playtesting with my friends and family, it was decided not to display the board. It's just not needed to play the game and only served as a time-consuming distraction once you get into the game.

Program Lines:

10-160	Setup and credits
160-300	Players' names and continue setup
310-380	Get game limit and start game
410-420	Start of turn, get next player
450-480	Die roll
520-560	Check for passing payday
590-630	Income Tax
640-650	Loan Payment
660-810	Good News
820-960	Bad News
970-1080	Landed on lot; check out owner
1090-1130	Take rent out of player's cash
1140-1350	Main menu
1230-1350	Secondary menu
1360-1420	Buying property
1430-1600	Selling property
1610-1820	Trading property
1830-2090	Building apartments

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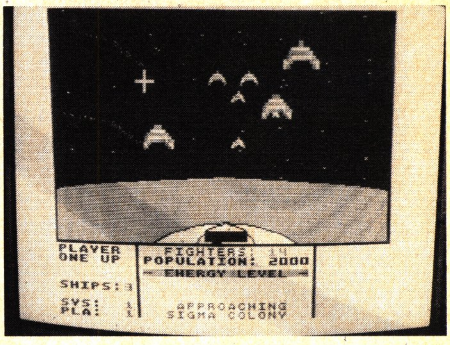
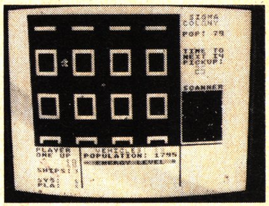
INTERCEPT 4

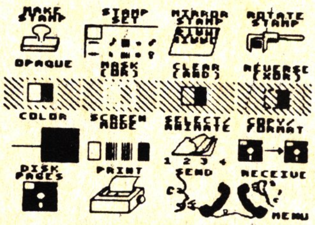
By J. Weaver, Jr.


PLAYER
ONE UP
FIGHTERS: 14
POPULATION: 2000
ENERGY LEVEL
SHIPS: 3
SYS: 1
PLA: 1
APPROACHING
SIGMA COLONY

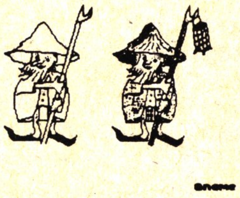
Your ship and the planet are under attack. Hostile alien craft whip around the ship, releasing flamming bolts of energy upon the hull of the INTERCEPT. Immediately your own guns come alive, warding off the sudden attackers, but will it be enough? Already many of the fighters have escaped past your ship toward the defenseless colonies below. Once the air battle is over, you must transport down to the planet, try to find the alien foe, and destroy them. Then, the hardest task awaits: using the full power of the INTERCEPT, you must battle and destroy the mother ship!! Three separate screens or levels of play. Each screen scrolls in all four directions. A fantastic new game by the author of Outhouse. Requires two joysticks.

32K $27.95/29.95

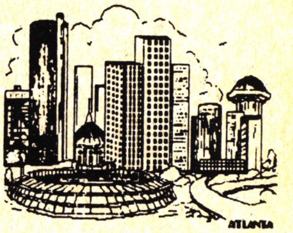

SIGMA
COLONY
POP: 79
TIME TO
NEXT PICKUP:
SCANNER
PLAYER
ONE UP
POPULATION: 1795
ENERGY LEVEL
SHIPS:
SYS:
PLA:


MAKE STAMP
STAMP SET
MIRROR STAMP
ROTATE STAMP
OPAQUE
MASK
CLEAR
REVERSE
COLOR
SCREEN MODE
SELECT/ANIMATE
COPY/FORMAT
1 2 3 4
DISK PAGES
PRINT
SEND
RECEIVE
MENU

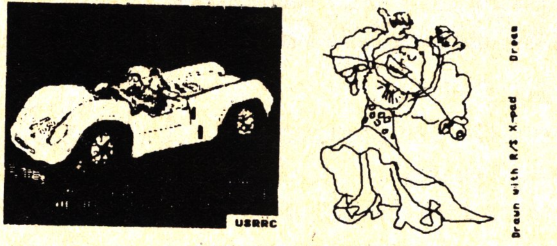
GRAPHICOM MENU



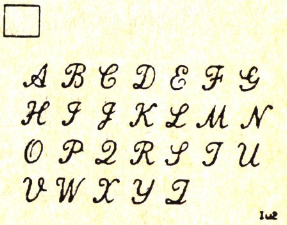
FROM PICTURE DISK #1



FROM PICTURE DISK #2


USRRC
Drawn with R/S X-pad
Dress

FROM PICTURE DISK #3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H I J K L M N
O P Q R S T U
V W X Y Z

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2370-2530	Recap and rundown of properties
2540	Check player's cash level
2550-2860	Deficient cash options
2860-2950	End of game
2980-3040	Payday
3050-3130	Economic Index
3140-3220	Rundown of properties

Variables List:

A$( )	Square names
P$( )	Players' names
S	Square used during the turn
F( )	Lot price
LB( )	Loan balance
LP( )	Loan payment
A1( )	Used to check assets
A2( )	Lot group number
P	Number of players
H( )	Number of apartments on a lot
P( )	Player's position on the board
H1( )	Number of times In-The-Hole
T	Turn number
L1	Game limit
I	Interest rate
M( )	Player's cash
Q( )	Used to identify players that have quit

For those of you who hate typing as much as I do, the program is on this month's RAINBOW ON TAPE, or I will send you a copy of *Landlord* on tape for $5. Send a SASE to Gene Meador, 8501 S. Brookline Ave., Oklahoma City, Okla., 73159.

For the more advanced programmers with 32K, here's a challenge: I've shown you the basics of how to write a program of this type, so why don't you create a program that plays Monopoly!

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1540	232	2900	167
1710	155	3170	87
1920	241	END	111

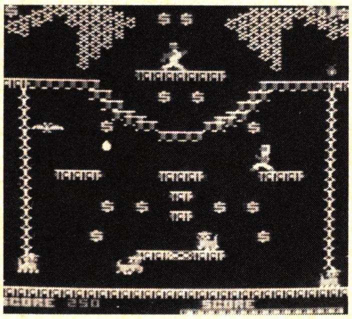
The listing:

```
10 CLS:CLEAR200
20 PRINT:PRINT:PRINT
30 PRINT@105,"COLOR COMPUTER":PR
INT@140,"PRESENTS"
40 PRINT@201,"L A N D L O R D"
50 PRINT@261,"WRITTEN BY GENE ME
ADOR"
60 GOSUB2960:GOSUB2960:DIM A$(32
),P$(10),S(32),F(32)
70 DIMLB(10),LP(10),A1(32),A2(32
),P(10),H(32),Q(10),H1(10)
80 FORX=1TO32:READA$(X):NEXT
90 DATA PAYDAY,AGNEW,BLACKWELDER
,DREXEL,GOOD NEWS!
100 DATA WALNUT,EASTERN,CLASSEN,
IN-THE-HOLE!,MANCHESTER
110 DATA WESTCHESTER,HAZELWOOD,B
AD NEWS!,PATTERSON
120 DATA ANN ARBOR,ROCKWELL, LOA
N PAYMENT DUE!,MAY AVE.
130 DATA LANSBROOK,PORTLAND,GOOD
 NEWS!,ROBINSON
140 DATA MACARTHUR,REGENCY BLVD,
INCOME TAX,BELLA VISTA
150 DATA LAKEVIEW,PARK MANOR,BAD
NEWS!,COUNTRY CLUB
160 DATA WILSHIRE BLVD,BROADWAY
170 CLS(1):PRINT:INPUT"HOW MANY
ARE PLAYING";P
180 FORX=1TOP:PRINT"PLAYER #"X"'
S NAME";
190 INPUTP$(X):M(X)=10000:P(X)=1
:Q(X)=0:NEXT
200 PRINT:PRINT"  I'LL KEEP TRAC
K OF EVERYTHING","FOR YOU, SO LE
T'S PLAY!"
210 GOSUB2960:M(0)=0
220 FORX=1TO32:READF(X):NEXT
230 DATA 0,500,500,500,0,800,800
,800,0
240 DATA 1500,1500,1500,0,1800,1
800,1800,0
250 DATA 2500,2500,2500,0,3000,3
```

CASH MAN

By Bill Dunlevy & Doug Frayer

Exploding with color, racing with fast animation, and roaring with sound, this great non-violent game is destined to be a classic! The review in February's issue of RAINBOW says this: "A Fun Investment" "it is totally unique" "I found it very tough to tear myself away from playing the game long enough to write about it! In short, CASHMAN is one fun game. Buy it."



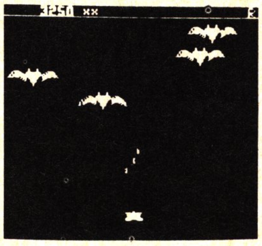
Dozens of levels and screens (more than FORTY!) offer anyone, from beginner to expert, as much good clean fun as they want! Higher levels include special Mystery Pieces and Expert Puzzle Pieces and Expert Puzzle Screens. Play alone or go for the ultimate challenge of two-player simultaneous competition. Run along the colorful girders, jump across the tremendous chasms, climb the ropes and ladders, or grab a BYRD and fly to get the loot before your opponent does, but watch out! The KATS are on the prowl and your opponent is tossing eggs! Run, jump, climb, or fly to your nearest Color Computer and play CASHMAN!

32K - Tape $27.95
Disk $29.95

DEMON SEED

By Jeffery Sorenson
& Phillip MacKenzie

All alone in the silence of space, you switch on the view-port to look at the brilliant stars. And then you see THEM: a massive hoard of bat-like aliens, swarming towards you! The ship trembles under the distant explosions of enemy fire. You have only one chance for survival - Fight! As you attempt to defeat each new wave of enemy ships, they only get stronger and faster! If by some miracle you survive the first assault, you find yourself pitted against enemies so swift, powerful, and outright evil that only one name fits them - DEMONS! And if that's not enough, they bring out the heavy artillery - the Mother Ship! Engaging in battle, you see a dark cloud against the stars: another invasion fleet!



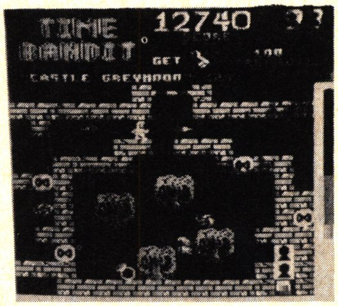
Created in the same spirit of the classic arcades games like Phoenix and Galaga, DEMON SEED is a great package of arcade fun and action. Different screens of bats, demons, and special challenge rounds keep the excitement high and the competition stiff!

32K-Tape $27.95
Disk $29.95

TIME BANDIT

By Bill Dunlevy & Harry Lafnear

Tired of games that only have a few screens or force you to follow strict levels? In TIME BANDIT, you virtually create your own game! You can choose from more than TWENTY places through-out the game, with more than 15 distinct variations and levels of difficulty in each place; this means over 300 variations!



Use the TIMEGATES to travel to the three different Worlds of Time, each containing a multitude of colorful and unique adventuring areas. Visit the medieval dungeons of FANTASY WORLD, recapture the days of yesteryear in WESTERN WORLD, and reach for the stars in FUTURE WORLD. Fight the Evil Guardians: the Looking Lurker, Angry Elmo, Killer Smurphs, and more! Find the Keys and escape with the treasures of time. But hurry - your power is fleeting! Crisp Supergraphics, colorful scrolling landscapes, full animation of a multitude of characters, great sound, and over THREE HUNDRED SCREENS - it's all here! The conquest of time and space awaits!

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DC-1 **$134**	ROM disk controller reads & writes to 35 and 40 track single and double sided drives with all models of the color computer (J&M)
VC-1 **$24.45**	Video interface mounts inside color computer by piggybacking IC on top of interface--no soldering and no trace cuts
VC-2 **$26.45**	for color computer 2 – monochrome only
VC-3 **$39.45**	for color computer 2 – color and monochrome

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DD-1 **$269**	½ height 5¼" 40 Track SSDD 179,712 bytes available
DD-2 **$319**	½ height 5¼" 40 Track DSDD 359,424 bytes available
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Drive 0 needs controller DC-1 above

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PRINTER

RX-80 **$299**	Epson printer needs parallel interface below	**RX-100** **$585**
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Any product may be returned within 30 days for refund if not satisfied.

We handle all warranty & repair work thru our direct contact with the manufacturer.

Shipping - $2 for controllers; $5 for disks; $7 for printers, monitors & 'packages'; $2.75 for stands. Canadian orders slightly higher.

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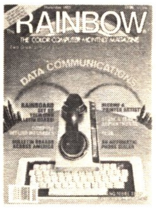

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It's called the *premier Color Computer magazine* for good reason. **The Rainbow** is the biggest, best, brightest and most comprehensive publication a happy CoCo ever had! Is there any wonder we get letters daily which praise **the Rainbow**, the magazine one reader calls "A Pot Of Gold" for his Color Computer?

The Rainbow features more programs, more information and more in-depth treatment of the TRS-80 Color, TDP System-100, MC-10 and Dragon-32 and 64 computers than anyone else.

Each monthly issue is well over 320 pages and contains more than two dozen programs, some 15 regular columns and 30 or more product reviews. And advertisements: **the Rainbow** is known as *the* medium for advertisers—which means every month it has a wealth of information unavailable anywhere else about new products! More than 200 companies advertise in its pages every month.

But what makes **the Rainbow** is its people. People like Bob Albrecht, the master teacher of computer programming. People like Don Inman, one of the world's best computer graphics authors. Experts like Dick White, one of the most knowledgeable writers about BASIC. Or, Dan Downard, **Rainbow** technical editor, who answers our readers' toughest questions. Educators like award-winning **Rainbow** columnist Steve Blyn. Advanced programmers like Dale Puckett, who guides you through Radio Shack's OS-9 operating system. Electronics specialists like Tony DiStefano, who explains the "insides" of the CoCo. These people, and many others, visit you monthly through columns available only in **the Rainbow.**

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Discover the other side of *the Rainbow*. It's not only a time-saver, it's the key to a whole new outlook!

```
000,3000,0
260 DATA 3500,3500,3500,0,4000,4
000,4000
270 FORX=1TO32:READA2(X)
280 NEXT:P$(0)="BANK":I=15
290 DATA0,1,1,1,0,2,2,2,0,3,3,3,
0,4,4,4
300 DATA0,5,5,5,0,6,6,6,0,7,7,7,
0,8,8,8
310 CLS(5):PRINT:PRINT"HOW MUCH
IN CASH AND ASSETS DO","ALL OF Y
OU WISH TO PLAY TO?"
320 PRINT"($50,000 IS AVERAGE)."
:INPUTL1
350 CLS(5):PRINT@32,"OK! THE FIR
ST PLAYER TO REACH","$"L1"IN CAS
H AND ASSETS"
360 PRINT"WILL WIN THE GAME!!":P
RINT
370 PRINT"THE OBJECT OF THE GAME
 IS TO ","FIGURE OUT HOW TO WIN!
"
380 PRINT:PRINT"LOTZA LUCK! (YOU
'LL NEED IT!)"
390 GOSUB2960:GOSUB2960
400 M(0)=0
410 CLS(5):SOUND 180,3:IF RND(20
))>18 THEN GOSUB 3050
420 T=T+1:IF T>P THEN T=1
430 IFQ(T)>0 THEN 420
440 PRINT@32,P$(T)"'S TURN":M(T)
=INT(M(T)):GOSUB2970
450 PRINT"PICK YOUR DIE ROLL:"
460 A=RND(11)+1:PRINT@98,A:R$=IN
KEY$:IFR$="" THEN 460
470 IF VAL(R$)<>A THEN PRINT"MIS
SED AGAIN!"
480 PRINT"YOUR CASH ON HAND IS $
"M(T)
490 GOSUB2970:PRINT
500 IFVAL(R$)=A THEN PRINT"EXTRA
 PAYDAY!!!":XX=1000:GOSUB3030
510 IF M(T)<=0 THEN 570
520 IF(P(T)+A>17)AND(P(T)<17)THE
N530 ELSE540
530 PRINT"PASSED LOAN PAYMENT DU
E!":IFLB(T)>0 THEN GOSUB3240
540 P(T)=P(T)+A:IFP(T)>32 THEN P
(T)=P(T)-32:GOSUB2980
550 S=P(T):IF S<>9 THEN590
560 IFS=1 THEN 2540
570 IFM(T)>0 THEN H1(T)=0:PRINT"
YOU'RE AT "A$(S):GOTO1150
580 H1(T)=H1(T)+1:SOUND1,30:GOTO
```

GRAPHICOM has established itself as the premium graphics program for the color computer. One of the outstanding features of this program is its ability to use a picture disk with lots of designs on it, to incorporate these pictures into other designs such as greeting cards, business announcements, school projects, electronics, etc.

At the last two Rainbowfests, demand for the picture disks has been overwhelming. We at MichTron are now going to come out with a new picture disk every month. If you would like to subscribe to this service for a year, it will be at a substantial savings. Picture disks are normally $19.95 each, plus $3.00 shipping and handling. One years subscription is only $199.95. You can save over 100 dollars by subscribing now!

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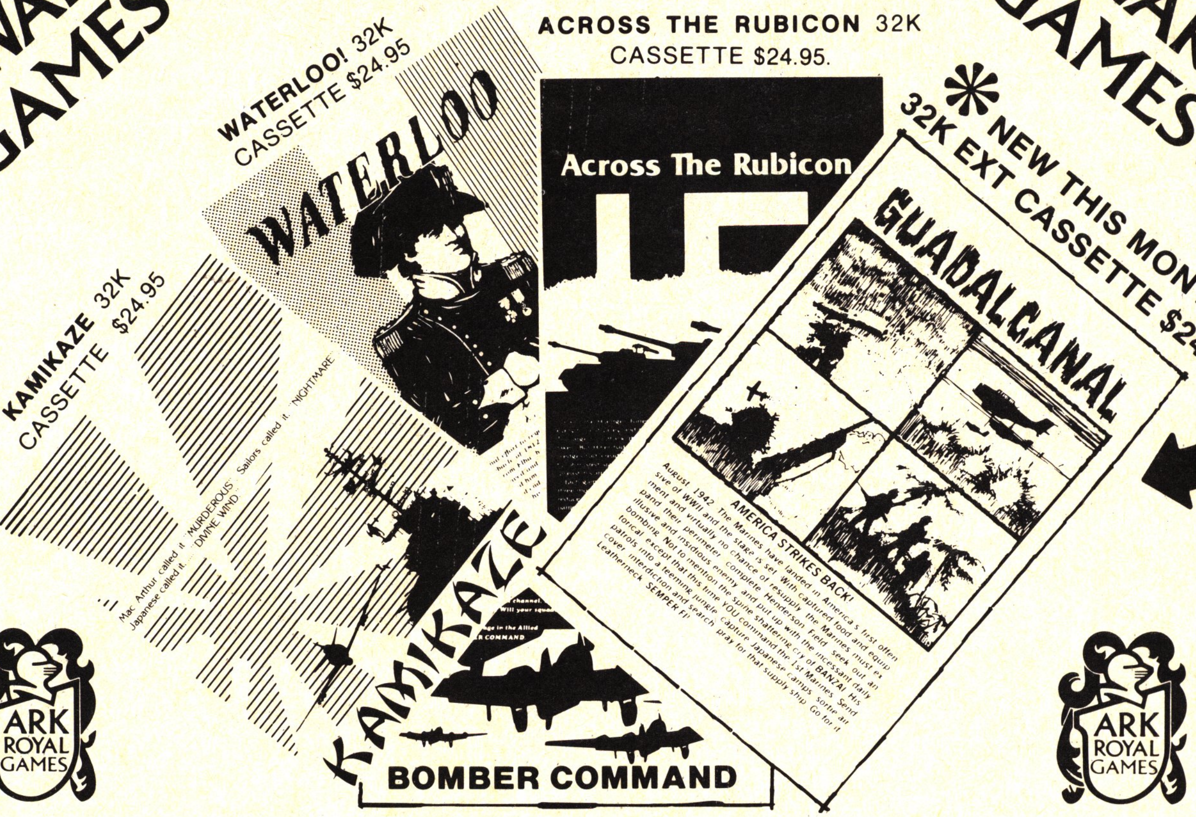
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All Programs require Color ComPuter™ (Tandy Corp) or TDF System 100 ComPuter™ (RCA)

```
2540
590 IF S<>25 THEN 640
600 SOUND1,30:PRINT:PRINT"OH,OH!
 INCOME TAX TIME!"
610 PRINT"YOU OWE 10% OF YOUR CA
SH ON","HAND. YOUR CASH IS $"M(T
)"
620 PRINT"SO YOU OWE $"M(T)*.1"!
!"
630 M(T)=M(T)-(M(T)*.1):M(T)=INT
(M(T)):GOTO1140
640 IF S<>17 THEN 660
650 PRINT"YOU LANDED ON LOAN PAY
MENT!":GOSUB3240:GOTO1160
660 IF S<>5 AND S<>21 THEN820
670 FORZ=200TO225:SOUNDZ,1:NEXT
680 X=RND(5):PRINT"GOOD NEWS!!!"
:PRINT
690 ON X GOTO 700,720,760,780,80
0
700 XX=RND(35)*.1:I=I-XX:I=INT(I
):IFI<5 THEN I=5
710 PRINT"BANK INTREST RATES HAV
E DROPPED","TO"I"% !":GOTO750
720 PRINT"PROPERTY VALUES JUST W
ENT UP","10% ON ALL YOUR PROPERT
IES!"
730 FORX=1TO32:IFA1(X)=T THEN F(
X)=INT(F(X)+(F(X)*.1))
740 NEXT:GOTO750
750 GOSUB2970:S=P(T):PRINT:GOTO1
160
760 PRINT"INCOME TAX REFUND!"
770 X=RND(500)+300:PRINT"YOU GET
 BACK $"X:M(T)=M(T)+X:GOTO750
780 PRINT"EVERYONE PAYS YOU $100
0!"
790 FORX=1TOP:M(X)=M(X)-1000:M(T
)=M(T)+1000:NEXT:GOTO750
800 PRINT"YOU GET GO TO PAYDAY!"
:GOSUB2970
810 P(T)=1:GOSUB2980:GOTO1160
820 IF S<>13 AND S<>29 THEN 970
830 SOUND1,40:PRINT:PRINT"BAD NE
WS......":GOSUB2970:PRINT
840 X=RND(6):ON X GOTO 845,850,8
80,910,930,950
845 PRINT"EVERYONE VOTED YOU 'LE
AST ","LIKELY TO WIN'!!":GOTO750
850 XX=RND(35)*.1:I=I+XX:I=INT(I
)
860 PRINT"BANK INTREST RATES HAV
E GONE UP","TO"I"%!"
870 GOSUB2960:GOTO1160
880 PRINT"ALL YOUR PROPERTY VALU
ES HAVE","DROPPED 10%!"
890 FORX=1TO32:IFA1(X)=T THEN F(
X)=F(X)-(F(X)*.1)
900 NEXT:GOTO870
910 PRINT"YOU PAY EVERYONE $1000
!"
920 FORX=1TOP:M(T)=M(T)-1000:M(X
)=M(X)+1000:NEXT:GOTO870
930 PRINT"IT'S INCOME TAX TIME A
GAIN!","(AND NO PASSING PAYDAY!)
"
940 GOSUB2960:P(T)=25:GOTO550
950 PRINT"OH NO! LOAN PAYMENT DU
E!!":GOSUB2960
960 IFLB(T)>0 THEN:GOSUB3240:GOT
O1140
970 PRINT"YOU'RE NOW AT "A$(S):M
(T)=INT(M(T))
980 IFA2(S)=0 THEN 1000
990 PRINT"OWNER: "P$(A1(S)):PRIN
T
1000 IFA1(S)=T ORA2(S)=0 THEN 11
60
1010 IF H(S)>0 THEN 1090
1020 IFA1(S)>0 THEN 1160
1030 GOSUB2960
1040 CLS:PRINT:PRINT"LOTS OF THI
S GROUP:":PRINT:FORX=1TO32
1050 IFA2(X)=A2(S) THEN PRINTA$(
X)"-"P$(A1(X))"'S-APTS.:"H(S)
```

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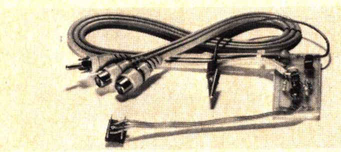
```
1060 NEXT:PRINT:PRINTA$(S)" IS $
"F(S)+(H(S)*F(S)*.1)
1070 PRINT"(YOUR CASH IS $"M(T)"
)"
1080 PRINT"BUILDING COSTS: $"F(S
)*.1"PER UNIT":GOTO1160
1090 D=RND(40)+60:IFH(S)<=0 THEN
1160
1100 PRINT"OF"H(S)"APARTMENTS,"I
NT(H(S)*D*.01)"ARE FILLED"
1110 RD=INT(H(S)*D*.01*F(S)*.125
):PRINT"RENT DUE IS $"RD
1120 M(A1(S))=M(A1(S))+RD
1130 M(T)=M(T)-RD:RD=0:PRINT"YOU
R CASH IS NOW $"M(T)
1140 GOSUB2960
1150 GOSUB2960:CLS:S=P(T)
1160 PRINT"WOULD YOU LIKE TO:"
1170 PRINT" B)BUY, P)PASS, R)SEE
 A RECAP,"," OR O)SEE OTHER OPTI
ONS?"
1180 R$=INKEY$:IFR$="" THEN 1180
1190 IFR$="B" THEN 1360
1200 IFR$="P" THEN 2540
1210 IFR$="R" THEN 2370
1220 IFR$="O" THEN 1230ELSE1180
1230 CLS:PRINT@32,"YOU HAVE THE
FOLLOWING OPTIONS:":PRINT
1240 PRINT"S) SELL SOME PROPERTY
","T) TRADE PROPERTIES"
1250 PRINT"A) BUILD MORE APARTME
NTS","L) GET A LOAN"
1260 PRINT"R) REDUCE YOUR LOAN B
ALANCE"
1270 PRINT"M) GO BACK TO MAIN ME
NU","Q) QUIT":PRINT:PRINT"YOUR C
HOICE?"
1280 R$=INKEY$:IFR$="" THEN1280
1290 IFR$="R" AND LB(T)>0 THEN 2
290
1300 IFR$="S" THEN1430
1310 IFR$="M" THEN 1160
1320 IFR$="T" THEN1610
1330 IFR$="A" THEN1830
1340 IFR$="L" THEN2100
1350 IFR$="Q" THEN2790ELSE1280
1360 IFA2(S)=0 THEN PRINT"YOU CA
N'T BUY "A$(S)"!":GOTO1150
1370 IF M(T)>F(S)+(F(S)*.1*H(S))
 THEN 1390
1380 PRINT"SORRY, YOU DON'T HAVE
 ENOUGH","CASH TO BUY IT!":GOTO1
150
1390 IFA1(S)=T THEN PRINT"YOU AL
READY OWN IT!":GOTO1150
1400 IFA1(S)<>0 THEN PRINTP$(A1(
S))" OWNS IT!":GOTO1150
1410 PRINT"TITLE DEED RECORDED"
```

```
1420 M(T)=M(T)-(F(S)+(F(S)*.1*H(
S))):A1(S)=T:GOTO1600
1430 CLS:GOSUB3140:INPUT"LOT NO.
 YOU'RE SELLING";S
1440 IFS<>0 THEN 1470
1450 CLS:GOSUB3190:INPUT" LOT NO
. YOU'RE SELLING";S
1460 IFS=0 THEN 1150
1470 IFS<0 OR S>32 THEN1490
1480 IFA1(S)=T AND A2(S)<>0 THEN
1500
1490 PRINT"SUPER BOO-BOO! TRY AG
AIN!":GOTO1150
1500 CLS:GOSUB3230
1510 INPUT"# OF PLAYER YOU'RE SE
LLING TO";Y
1520 IFY=T ORY<1 OR Y>P THEN PRI
NT"OOPS!":GOTO1150
1530 INPUT"HOW MUCH ARE YOU GETT
ING";XX:XX=INT(XX)
1540 PRINT"SELLING "A$(S)" TO "P
$(Y),"FOR $"XX", CORRECT?"
1550 R$=INKEY$:IFR$="" THEN 1550
1560 IFR$<>"Y" THEN PRINT"HUMANS
!":GOTO1150
1570 IFXX>M(Y) THEN PRINT"WRONG-
 HE HASN'T ENOUGH $$$!":GOTO1150
1580 M(T)=M(T)+XX:M(Y)=M(Y)-XX:A
1(S)=Y
1590 PRINT"TRANSACTION COMPLETE.
":S=P(T)
1600 PRINT"YOUR CASH IS NOW $"M(
T):GOTO1150
1610 CLS:PRINT@32,"YOU MAY ONLY
TRADE 1 FOR 1.":PRINT
1620 PRINT"(IF YOU'RE TRADING 2
OR MORE,","'SELL' THOSE LOTS)"
1630 GOSUB2960:GOSUB2960:CLS:GOS
UB3230
1640 INPUT"# OF PLAYER YOU'RE TR
ADING WITH";Y
1650 IFY<1ORY>P ORY=T THEN PRINT
"OOPS!":GOTO1150
1660 CLS:GOSUB3140:INPUT"YOUR LO
T NO. (IF ANY)";S
1670 IFS<>0 THEN1690
1680 CLS:GOSUB3190:INPUT"YOUR LO
T NO. (IF ANY)";S
1690 IFS<=0 ORS>32 THEN 1490
1700 IF A2(S)=0 THENPRINT"CAN'T
TRADE "A$(S):GOTO1150
1710 IFA1(S)<>T THENPRINT"I NEED
 YOUR LOT NO.":GOTO1660
1720 CLS:PRINT"NOW CHOOSE "P$(Y)
"'S LOT:"
1730 GOSUB3140:INPUT"LOT #";SS:I
F SS<>0 THEN 1750
1740 CLS:GOSUB3190:INPUT"LOT #";
```

MORETON BAY SOFTWARE

DOUBLE DRIVER

The BEST monitor driver available, unlike some monitor drivers the Double Driver provides TRUE monochrome and color composite output. Audio Output. Solderless installation. $24.95



RESET YOUR COMPUTER

A REAL Improvement

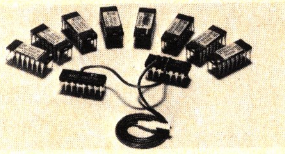
Move the power switch and reset where they belong. An LED power on light too! High quality parts. Totally solderless kit.

CoCo I $24.95
CoCo II $27.95

*
:
=
-
P
@
←
→
+
;
ENTER
CLEAR

64K UPGRADES

Instantly access 64K via M/L Totally solderless kit to upgrade E Boards. Kit includes eight 4164 prime chips and chips U29 and U11 already soldered. E Board Kit $69.95
Color Computer II kit requires soldering. $64.95



GRAPHICOM

The Ultimate Graphic Utility

You must see this program to believe it! Create pictures and text on the same screen. Now you can create pictures as good as any graphic you have seen on the color computer. Write graphic adventures or educational programs. Requires 64K EXB, Disk Drive and Joy Sticks $29.95

MORETON BAY SOFTWARE

A Division of Moreton Bay Laboratory

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(805) 962-3127

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32K Disk R/S DOS $99.95

MORE INVENTORY - Maintain an inventory of more than 1000 items. Know when to order, what has been ordered, quantity and value of any item. Calculate inventory value with single keystroke.

32K Disk R/S DOS $44.95

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COCOWRITER II — Powerful and full featured. An excellent word processor at an affordable price. 32, 51, 64 or 85 characters per line, justify right, left, center, insert, delete, move blocks. Menu driven printing and formatting. Tabs, etc. One of the best values in word processing today!

16 K EXB Cassette $34.95, 16K EXB Disk $44.95

THINKING GAMES

TRIVIA — THE EINSTEIN EDITION - A one to four player trivia game. More than 1900 challenging questions. Great for parties or family fun.

16K Non Extended $19.95 Cassette, $21.95 Disk

CUT-N-GLUE

A Companion to the Coco-Writer II

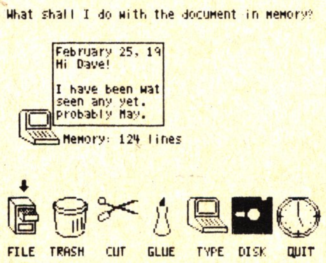
Super User Friendly **100% Machine Language**

Graphic windows and icons guide you every step of the way. Small pictures show you what exactly is happening, or what steps you can do next. Up to seven text windows on the same screen!

You can now have a filing cabinet in the computer's memory with up to six file folders. Each folder can contain a word processor document or part of a document. The document(s) being edited can be cut up, glued together in any way you wish, swapped between folders and the edit memory and ultimately saved. You will now have 17,664 characters of edit memory and 29,183 characters of file cabinet memory (for the six folders). More than 46K of document space!

Requires: 64K Extended and the CoCo Writer II. A disk drive is strongly recommended but not essential.

CUT-N-GLUE Disk $26.95, Tape $24.95

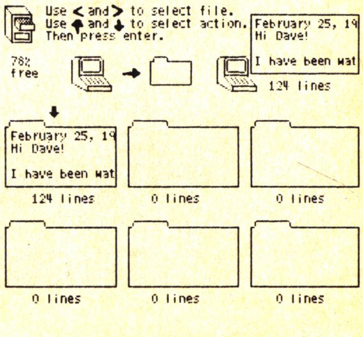


```
What shall I do with the document in memory?

February 25, 19
Hi Dave!

I have been wat
seen any yet.
probably May.

Memory: 124 lines
```



```
Use < and > to select file.
Use ↑ and ↓ to select action.
Then press enter.

78%
free

February 25, 19
Hi Dave!

I have been wat

124 lines

February 25, 19
Hi Dave!

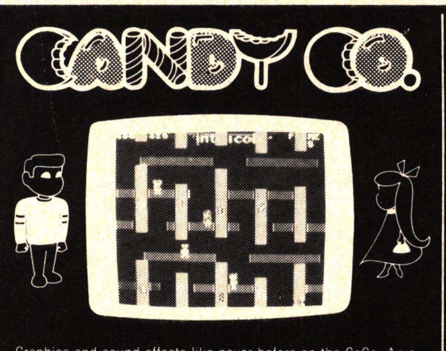
I have been wat

124 lines      0 lines      0 lines

0 lines        0 lines      0 lines
```

```
SS
1750 IFSS<=0 OR SS>32 THEN1490
1760 IFA1(SS)<>Y THEN1490
1770 CLS:PRINT"IF YOU ARE ALSO R
ECEIVING CASH,","INPUT THAT NOW.
"
1780 PRINT"IF YOU PAY,INPUT A NE
GATIVE","FIGURE. (IF NO CASH IS
INVOLVED"
1790 PRINT"JUST HIT 'ENTER')."
1800 INPUTYY:IF YY<M(Y) THEN 182
0
1810 PRINT"DEAL'S OFF- NOT ENOUG
H CASH!!":GOTO1150
1820 M(T)=M(T)+YY:M(Y)=M(Y)-YY:A
1(S)=Y:A1(SS)=T:GOTO1590
1830 CLS:GOSUB3140:INPUT"LOT NO.
 (IF NONE HIT 'ENTER')";S
1840 IFS<>0 THEN 1860
1850 CLS:GOSUB3190:INPUT"LOT NO.
 (IF NONE, HIT 'ENTER')";S
1860 IFS<=0 ORS>32 THEN 1490
1870 IFA1(S)<>T THEN1490
1880 IFH(S)>0 THEN 1920
1890 XX=0:FORX=1TO32:IFA2(X)=A2(
S) AND A1(X)=T THEN XX=XX+1
1900 NEXT:IFXX=3 THEN1920
1910 PRINT"SORRY, YOU DON'T OWN
ALL OF","THAT GROUP OF LOTS!":GO
TO1140
1920 CLS(5):PRINT:PRINTA$(S)" HA
S"H(S)"APARTMENTS"
1930 PRINT"ON IT NOW. EACH APT.
IS $"INT(F(S)*.1),"APIECE.":PRIN
T
1940 PRINT"(YOUR CASH IS $"M(T)"
)"
1950 INPUT"HOW MANY DO YOU WISH
TO ADD";XX
1960 IFXX<=0 THEN 1150
1970 IF(XX*F(S)*.1)<M(T) THEN199
0
1980 PRINT"SORRY, YOU ONLY HAVE
THE CASH","TO BUILD"INT(M(T)/(F(
S)*.1)):GOTO1140
1990 IFH(S)+XX<=50 THEN 2010
2000 PRINT"SORRY, NO MORE THAN 5
0 APTS.","PER LOT ALLOWED.":GOTO
1150
2010 PRINTXX"UNITS AT $"INT(F(S)
*.1)"IS $"F(S)*XX*.1
2020 PRINT"IS THAT OK WITH YOU?"
2030 R$=INKEY$:IFR$="" THEN2030
2040 IFR$<>"Y" THEN1160
```

Setting The Standards



Graphics and sound effects like never before on the CoCo. An exciting original arcade action game. Control your hero through a maze of moving conveyor belts. Outsmart bad guys and save Q.P. Doll. Over 1,000 frames of increasing difficulty.

100% ML, original title screen music, 1 or 2 players, colorful Hi Res graphics, exciting sound effects, joystick or keyboard input, pause feature, 8 digit scores and high score name entry. For 32K CoCo and TDP-100.

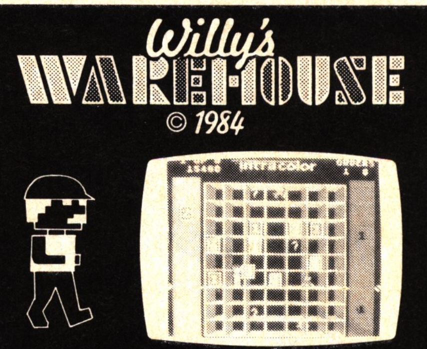
Cassette-34.95 Disk-34.95

intracolor
Grand Prix
Grand Prix

Strap yourself into the ultra responsive Formula I car and rev the throttle to fire 500 screaming horses to life. Your heart pounds in anticipation of the race. The green flag drops and you are slammed back into your seat as the field thunders off in a deafening roar.

An exciting racing game in colorful Hi Res graphics with realistic sound effects. Joystick or keyboard input. Joystick input is compatible with all joysticks. Many different tracks to choose from. For 32K CoCo and TDP-100.

Cassette-34.95 Disk-34.95



Another exciting original arcade action game. Help Willy stock the warehouse while keeping up with incoming orders. Watch out for the antagonists who intend to make your day long.

Excellent graphics and sound effects. 100% ML, 1 or 2 players, demonstration mode, selectable difficulty, joystick or keyboard input, pause feature and high score list with name entry. For 32K CoCo and TDP-100.

Cassette-34.95 Disk-34.95

COLORPEDE

RAINBOW CERTIFICATION SEAL

This truly outstanding engineer designed, 100% ML game with multi-colored Hi Res characters and fast action will challenge the most avid arcade buff. 1 or 2 players with joysticks or keyboard. COLORPEDE slithers through the toad stools. Demonstration mode with top 5 scores. Pause feature. For 16K CoCo and TDP-100.

Casssette-29.95 Disk-34.95

". . . forefront of the pack . . ." RAINBOW, Dec. '82

ROBOTTACK

You are the super human who must fight off the attacking robots and save the remaining humans from destruction. You have super human powers, can shoot in any direction and move anywhere on the screen to accomplish your vital mission.

Engineer designed, 1 or 2 players and top 5 scores displayed. Pause feature. For 16K CoCo and TDP-100 with joysticks.

Cassette-24.95 Disk-27.95

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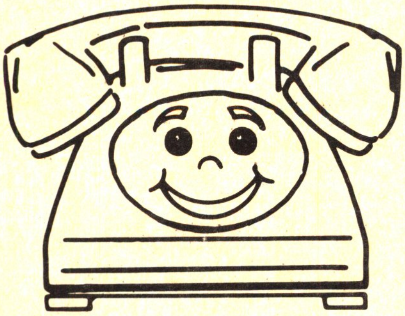
DEALER INQUIRIES INVITED QUALITY PROGRAMS SOLICITED

```
2050 H(S)=H(S)+XX:M(T)=M(T)-(F(S
)*XX*.1)
2060 PRINT"OK, THEY'RE BUILT."
2070 PRINT"WANT TO BUILD SOME MO
RE?"
2080 R$=INKEY$:IFR$="" THEN 2080
2090 IFR$="Y" THEN1830ELSE1590
2100 GOSUB3340:CLS(5):XX=XX*.5:P
RINT:IFXX>10000 THEN XX=10000
2110 PRINT:PRINT"YOUR CREDIT LIM
IT IS $"XX-LB(T):PRINT
2120 INPUT"HOW MUCH DO YOU WANT
TO BORROW";Y
2130 IFY>XX-LB(T) THEN 2360
2140 PRINT"LOAN TERMS:"
2150 PRINT"LOANS ARE FOR 10 TRIP
S AROUND","THE BOARD. NEW LOANS
ARE CON-"
2160 PRINT"SOLIDATED WITH EXISTI
NG LOANS."
2170 PRINT"(SIMPLE INTEREST IS U
SED, THE","RATE NOW IS"I"%.)"
2180 GOSUB2960:GOSUB2970:CLS(5)
2190 PRINT:PRINT"LOAN BALANCE NO
W IS $"LB(T)
2200 PRINT"(INTREST CHARGES ARE
$"Y*I/100")
2210 PRINT"NEW BALANCE WILL BE $
"LB(T)+Y+(Y*I/100)
2220 PRINT"NEW PAYMENTS:$"(LB(T)
+Y+(Y*I/100))/10
2230 PRINT:PRINT"IS THIS OK WITH
 YOU?"
2240 R$=INKEY$:IFR$="" THEN 2240
2250 IFR$<>"Y" THEN1160
2260 LB(T)=LB(T)+Y+(Y*I/100):LP(
T)=LB(T)/10
2270 LB(T)=INT(LB(T)):LP(T)=INT(
LP(T)):Y=INT(Y)
2280 M(T)=M(T)+Y:GOTO1590
2290 CLS:PRINT@32,"YOUR LOAN BAL
ANCE IS $"LB(T):PRINT"YOUR CASH
IS $"M(T)
2300 :PRINT:INPUT"HOW MUCH WOULD
 YOU LIKE TO PAY ";X
2310 IFX=0 THEN1160
2320 IFX<0 ORX>M(T) ORX>LB(T) TH
ENPRINT"OOPS!!":GOTO1160
2330 M(T)=M(T)-X:LB(T)=LB(T)-X
2340 IFLB(T)<=5 THEN LB(T)=0:LP(
T)=0
2350 GOTO1590
2360 PRINT"SORRY, YOUR LOAN IS D
ENIED DUE","TO LACK OF ASSETS.":
```



AUTOTERM
TURNS YOUR COLOR COMPUTER INTO THE
WORLD'S SMARTEST TERMINAL!
YOU'LL ALSO USE AUTOTERM FOR SIMPLE WORD PROCESSING & RECORD KEEPING

EASY TO USE

ON-SCREEN EDITING via cursor. Full prompting and error checking. Key Beep and Error Beebop. Scroll bkwd/fwd while on line. Save/load files while on line. Maintain a disk copy of session. Automatic graphics. True lower case. Screen widths of 32, 40, 42, 50, 64. No split words on screen/printer. Print all or part of text. Search for strings. Well written manual goes step-by-step and has many KSM examples. Back cover is a cheat sheet.

RECOMMEND 32K to 64K
EASY UPGRADE
Price Difference +$13

PLEASANTLY POWERFUL

Total communications ability, 128 ASCII chars, 1200 baud, etc. Send text, graphics, BASIC, ML. Scan/Edit current data while receiving more data. Any modem. Fully supports D.C. Hayes and others. Any printer, page size, margins, etc. Override narrow text width of received data. Examine/change parameters, KSMs and disk directories at any time. Handles files which are larger than memory.

CASSETTE $39.95
DISKETTE $49.95
Add $3 shipping and handling
MC/VISA/C.O.D.

TRULY AUTOMATIC

Create, edit, print, save and load Keystroke Multipliers (KSMs). KSMs automate almost any activity. Dial via modem, sign-on, interact, sign-off. Perform entire session. Act as a message taker. KSM may include parameter changes, disk operations, editing, time delays, looping, execution of other KSMs, waiting for part-specified responses, branching based upon responses.

PXE Computing
11 Vicksburg Lane
Richardson, Texas 75080
214/699-7273

```
GOTO1150
2370 CLS:PRINT:PRINTP$(T)", YOU'
RE ON "A$(S)
2380 PRINT"YOUR CASH IS $"M(T)
2390 PRINT"YOUR LOAN BALANCE IS
$"LB(T)
2400 IFLB(T)<=0 THEN2430
2410 PRINT"LOAN PAYMENTS ARE $"L
P(T)
2420 PRINT"PAYMENTS LEFT ="INT(L
B(T)/LP(T))
2430 GOSUB3340:PRINT"CREDIT AVAI
LABLE IS $";
2435 XX=XX*.5
2440 IFXX>10000 THEN XX=10000
2450 IFXX-LB(T)<0 THEN PRINT"0"E
LSEPRINTXX-LB(T)
2460 PRINT:PRINT"WOULD YOU LIKE
TO SEE A RUNDOWN","OF ALL THE PR
OPERTIES?"
2470 R$=INKEY$:IFR$="" THEN 2470
2480 IFR$<>"Y" THEN1160
2490 CLS:GOSUB3140:PRINT"HIT ANY
 KEY FOR THE REST."
2500 R$=INKEY$:IFR$="" THEN 2500
2510 CLS:GOSUB3190:PRINT"REPEAT
DISPLAY?"
2520 R$=INKEY$:IFR$="" THEN2520
2530 IFR$="Y" THEN 2490ELSE1160
2540 IFM(T)>0 THEN H1(T)=0:GOTO2
830
2550 CLS:PRINT@96,"OH,OH! YOU'RE
 BROKE!($"M(T)")"
2560 PRINT"(TIME NO."H1(T)"!!)"
2570 IFH1(T)=3 THEN PRINT"LAST T
IME!"
2580 PRINT"YOU HAVE SEVERAL OPTI
ONS:"
2590 PRINT"L) GET A LOAN"
2600 PRINT"S) SELL SOME PROPERTY
"
2610 IF H1(T)<=3 THEN PRINT"I) G
O 'IN-THE-HOLE'"
2620 PRINT"R) LET THE BANK REPOS
SES ENOUGH","    PROPERTY TO GET
YOU AHEAD"
2630 PRINT"    (AT 1/2 IT'S VALUE
)"
2640 PRINT"Q) (GULP!) QUIT!"
2650 PRINT"WHAT DO YOU WANT TO D
O?"
2660 R$=INKEY$:IFR$="" THEN 2660
2670 IFR$="S" THEN 1430
2680 IFR$="R" THEN2730
2690 IFR$="L" THEN2100
2700 IFR$="Q" THEN2790
2710 IFR$="I" AND H1(T)<4 THEN 2
720ELSE2660
2720 P(T)=9:GOTO410
2730 CLS:PRINT:FORX=1TO32:IFM(T)
>0 ORA1(X)<>T THEN 2760
2740 M(T)=M(T)+(F(X)+(H(X)*F(X)*
.1))/2:A1(X)=0
2750 PRINT"REPOSSED "A$(X)" W/"H
(X)"APTS."
2760 NEXTX
2770 PRINT:PRINT"YOU RECEIVED 1/
2 THE VALUE OF","THE ABOVE PROPE
RTIES."
2780 GOSUB2960:GOSUB2960:GOTO159
0
2790 CLS:PRINT:PRINT"WELL, YOU T
RIED ANYWAY!":Q(T)=1:GOSUB2970
2800 FORX=1TO32:IFA1(X)=T THEN M
(T)=M(T)+(F(X)+(H(X)*(F(X)*.1)))
2810 IFA1(X)=T THEN A1(X)=0
2820 NEXT
2830 XX=0:FORX=1TOP:IFQ(X)>0 THE
NXX=XX+1
2840 NEXT
2850 IFXX=>P-1 THEN 2870
2860 GOSUB3340:IFM(T)+XX-LB(T)>L
1 THEN 2870ELSE410
2870 CLS:PRINT@64," END OF GAME!
"
```

POKES, PEEKS 'N EXECS

Here is the exhaustive file YOU HAVE BEEN WAITING FOR! Contains OVER 150 Pokes, Peeks & Execs with full explaination on use for each. BREAK-KEY disable, Reset Disables, LIST, LLIST & DIR disables. Commands for Cassette, Disk & Printer and MUCH MUCH MORE! BONUS: A Tape-To-Disk copy program .. ONLY $8.00

HIDE-A-BASIC

A perfect utility to protect your basic programs with 4 ML routines to disable LIST, BREAK-KEY, RESET and create an ONERR GOTO routine. 16K EXT. BASIC TAPE-$16.95

ALPHA-DIR

Arrange your DISK directory in alphabetical order.
16K ECB. TAPE $6.95 ....DISK — $14.95

COLOR PAD

Enhance your artistic capabilities. Draw anything from planes to landscapes. Create dazzling patterns. Edit, paint, erase & save to tape or disk. BONUS: Airplanes Color Sketch Book Program. 16K ECB. No Joystks req.
TAPE - $16.95 .... DISK - $19.95

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Dealers Inquiries invited

NEW GOOD STUFF FOR EVERY COLOR COMPUTER

MAGIGRAPH

Turn your Color Computer into a graphic design center with the ease of a keystroke! **MagiGraph** makes it simple to create highly detailed figures up to and including an entire high-resolution screen. Designed for those with some experience in Basic and Assembly Language programming, **MagiGraph** includes lots of special features:

- **A full set of logical and pixel manipulation functions** simplifies the development of complex figures.
- **An editor** lets you zoom in and work on every detail of your design. Toggle between the "macro" and "micro" screens for perspective on your creations.
- **Nine animation buffers** allow you to preview each sequence to ensure continuity and smooth flow.
- **Versatile I/O routines** store a graphic screen on cassette or floppy disk; recall it later for use by another program or revise it with **MagiGraph**.

If you're looking for the finest graphic development utility available for your Color Computer, THIS IS IT. Maximize your machine's potential, while you push your imagination to the limit — with **MagiGraph**!

By Kevin Dooley. Cassette **$34.95** (16K required); Disk **$39.95** (32K Extended Color BASIC required); Amdisk cartridge **$44.95.**

CSPOOL
Color Computer Print Spooler

Stop Waiting Around for the Printer! **CSPOOL** allows you to use your printer and computer concurrently, takes only 26 bytes of Color Basic's memory, and gives you 32K of print buffer. It's like having two computers in one! By intercepting characters sent to the printer and storing them in the upper 32K of RAM, **CSPOOL** allows you to run other programs while your printer is doing its job. **CSPOOL** is FREE with the purchase of a 64K RAM UPGRADE KIT from The Micro Works, or it may be purchased separately on cassette or diskette for **$19.95**. Requires 64K; not for FLEX or OS9.

64K MEMORY UPGRADE KIT: For Rev. levels E, ET, NC, TDP-100s, and Color Computer II. Eight prime 64K RAM chips, instructions, and CSPOOL: **$64.95.**

SYSTEMS SOFTWARE

MACRO-80C: DISK-BASED EDITOR, ASSEMBLER AND MONITOR—With all the features the serious programmer wants, this package includes a powerful 2-pass macro assembler with conditional assembly, local labels, include files and cross referenced symbol tables. MACRO-80C supports the complete Motorola 6809 instruction set in standard source format. Incorporating all the features of our Rompack-based assembler (SDS-80C), MACRO-80C contains many more useful instructions and pseudo-ops which aid the programmer and add power and flexibility. The screen-oriented editor is designed for efficient and easy editing of assembly language programs. MACRO-80C allows global changes and moving/copying blocks of text. You can edit lines of assembly source which exceed 32 characters. DCBUG is a machine language monitor which allows examining and altering of memory, setting break points, etc.

Editor, assembler and monitor—along with sample programs—come on one Radio Shack compatible disk. Extensive documentation included. By Andy Phelps. **$99.95**

SDS-80C: SOFTWARE DEVELOPMENT SYSTEM—Our famous editor, assembler and monitor in Rompack. Like MACRO-80C, it allows the user to write, assemble and debug assembly language programs with no reloading, object patching or other hassles. Supports full 6809 instruction set. Complete manual included. **$89.95**

MICROTEXT: COMMUNICATIONS VIA YOUR MODEM! Now you **can** use your printer with your modem! Your computer can be an intelligent printing terminal. Talk to timeshare services or to other personal computers; print simultaneously through a second printer port; and re-display text stored in memory. Download text to Basic programs; dump to a cassette tape, or printer, or both. Microtext can be used with any printer or no printer at all. It features user-configurable duplex/parity for special applications, and can send any ASCII character. You'll find many uses for this general purpose module! ROMPACK includes additional serial port for printer. **$59.95**

MICRO WORKS COLOR FORTH

- Faster to program in than Basic
- Easier to learn than Assembly Language
- Executes in less time than Basic

The MICRO WORKS COLOR FORTH is a Rompack containing everything you need to run Forth on your Color Computer. COLOR FORTH consists of the standard Forth Interest Group (FIG) implementation of the language plus most of FORTH-79. It has a super screen editor with split screen display. Mass storage is on cassette. COLOR FORTH also contains a decompiler and other aids for learning the inner workings of this fascinating language. It will run on 4K, 16K, and 32K computers. And COLOR FORTH contains 10K of ROM, leaving **your** RAM for **your** programs! There are simple words to effectively use the Hi-Res Color Computer graphics, joysticks, and sound.

Includes a 112-page manual with a glossary of the system-specific words, a full standard FIG glossary and complete source listing.

MICRO WORKS COLOR FORTH . . . THE BEST! From the leader in FORTH, Talbot Microsystems. **$109.95**

MACHINE LANGUAGE

MONITOR TAPE: A cassette tape which allows you to directly access memory, I/O and registers with a formatted hex display. Great for machine language programming, debugging and learning. It can also send/receive RS232 at up to 9600 baud, including host system download/upload. 19 commands in all. Relocatable and reentrant. **CBUG TAPE: $29.95**

MONITOR ROM: The same program as above, supplied in 2716 EPROM. This allows you to use the entire RAM space. And you don't need to reload the monitor each time you use it. The EPROM plugs into the Extended Basic ROM Socket or the Romless Pack I. **CBUG ROM: $39.95**

SOURCE GENERATOR: This package is a disassembler which runs on the Color Computer and generates your own source listing of the BASIC interpreter ROM. Also included is a documentation package which gives useful ROM entry points, complete memory map, I/O hardware details and more. A 16K system is required for the use of this cassette. **80C Disassembler: $49.95**

HARDWARE

PARALLEL PRINTER INTERFACE—Serial to parallel converter allows use of all standard parallel printers. PI80C plugs into the serial output port, leaving your Rompack slot free. You supply the printer cable. **PI80C: $59.95**

SUPER-PRO KEYBOARD—$69.95 (For computers manufactured after Oct. 1982, add $4.95)

ROMLESS PACKS for your custom EPROMS — call or write for information.

BOOKS

6809 ASSEMBLY LANGUAGE PROGRAMMING, by Lance Leventhal, **$18.95**

TRS-80 COLOR COMPUTER GRAPHICS, by Don Inman, **$14.95**

ASSEMBLY LANGUAGE GRAPHICS FOR THE TRS-80 COLOR COMPUTER, by Don Inman, **$14.95**

STARTING FORTH, by L. Brodie, **$17.95**

GAMES

ZAXXON—The real thing. Excellent. What more can we say? Cassette requires 32K. **$39.95**

STAR BLASTER—Blast your way through an asteroid field in this action-packed Hi-Res graphics game. Available in ROMPACK; requires 16K. **$39.95**

PAC ATTACK—Try your hand at this challenging game by Computerware, with fantastic graphics, sound and action! Cassette requires 16K. **$24.95**

HAYWIRE—Have fun zapping robots with this Hi-Res game by Mark Data Products. Cassette requires 16K. **$24.95**

ADVENTURE—*Black Sanctum* and *Calixto Island* by Mark Data Products. Each cassette requires 16K. **$19.95** each.

CAVE HUNTER—Experience vivid colors, bizarre sounds and eerie creatures as you wind your way through a cave maze in search of gold treasures. This exciting Hi-Res game by Mark Data Products requires 16K for cassette version. **$24.95**

THE MICRO WORKS

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(619) 942-2400

California Residents add 6% Tax

Master Charge/Visa and COD Accepted

```
2880 PRINT"HERE'S THE STANDINGS
IN TOTAL","ASSETS, LESS ANY LOAN
S:":PRINT
2890 FORX=1TO32
2900 IFA1(X)>0 THEN M(A1(X))=M(A
1(X))+F(X)+(H(X)*F(X)*.1)
2910 NEXT
2920 Z=1:FORX=1TOP:PRINTP$(X)":$
"M(X)-LB(X):M(X)=M(X)-LB(X)
2930 IFM(X)>M(Z) THEN Z=X
2940 NEXT:PRINT:PRINT"     "P$(Z)
" WON!!!!!"
2950 PRINT:PRINT:PRINT"HOPE YOU
HAD FUN!":END
2960 FORZ=1TO2000:NEXT
2970 FORZ=1TO2000:NEXT:SOUND190,
1:RETURN
2980 CLS:FORZ=1TO25:SOUNDZ,1:PRI
NT@RND(400),"$":NEXT
2990 PRINT@107,"PAYDAY!"
3000 PRINT:PRINT@224,"YOU RECEIV
E A PAYCHECK EQUAL","TO 10% OF Y
OU HOLDINGS OR"
3010 PRINT"$2000, WHICH EVER IS
HIGHER.":GOSUB3340
3020 XX=INT(XX*.1):IFXX<2000 THE
N XX=2000
3030 PRINT:PRINT"YOUR PAYCHECK I
S $"XX
3035 PRINT"YOU NOW HAVE $"M(T)+X
X
3040 M(T)=M(T)+XX:GOSUB2960:RETU
RN
3050 X=RND(40)
3060 PRINT"NEWS FLASH:"
3070 FORZ=1TO7:SOUND 200,2:NEXT
3080 PRINT"ECONOMIC INDEX CHANGE
 OF";
3090 IFRND(20)>11 THEN X=-X
3100 PRINTINT(X*2):I=I+(X*.1):I=
INT(I)
3110 IFI<5 THENI=5
3120 PRINT"LOAN INTEREST IS NOW"
I"%!"
3130 GOSUB2960:CLS:RETURN
3140 PRINT"LOT GROUP NAME
OWNER APTS"
3150 PRINT
3160 FORX=1TO16:IFA2(X)=0 THEN31
80
3170 PRINTX"-";TAB(5);A2(X);TAB(
6);A$(X);TAB(21);P$(A1(X));TAB(2
7);H(X)
3180 NEXTX:SOUND180,1:RETURN
3190 PRINT"LOT GROUP NAME
 OWNER APTS"
3200 FORX=17TO32:IFA2(X)=0 THEN3
220
3210 PRINTX"-";TAB(5);A2(X);TAB(
6);A$(X);TAB(21);P$(A1(X));TAB(2
7);H(X)
3220 NEXTX:SOUND180,1:RETURN
3230 FORX=1TOP:PRINTX"-"P$(X):NE
XT:RETURN
3240 LB(T)=LB(T)-LP(T):IFLB(T)<5
 THENLB(T)=0:LP(T)=0
3250 M(T)=M(T)-LP(T)
3260 SOUND32,10:SOUND32,10:SOUND
32,5:SOUND32,10:SOUND69,10:SOUND
58,5:SOUND58,10
3270 SOUND32,5:SOUND32,10:SOUND1
9,5:SOUND32,10
3280 PRINT:PRINT"PAYMENT DUE:$"L
P(T)
3290 PRINT"NEW BALANCE=$"LB(T)
3300 IFLB(T)<=0 OR LP(T)<=0 THEN
3330
3310 PRINT"LOAN PAYMENTS LEFT:"I
NT(LB(T)/LP(T))
3320 PRINT"CASH IS NOW $"M(T):GO
SUB2960
3330 GOSUB2960:CLS:RETURN
3340 XX=0:FORX=2TO32:IFA1(X)=T T
HEN XX=XX+F(X)+(H(X)*F(X)*.1)
3350 NEXT:XX=INT(XX):RETURN
```

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State of the Art, Quality, Integrity, Compatibility and Affordability. Five things good software must possess. Five things that epitomize the **VIP Library™**. Each program is the diamond of its class, true excellence. These programs are first in features, first in power, first in memory, and all are affordably priced. And for your convenience all disk programs can be backed up.

State Of The Art

All **Library** programs are written in machine code specifically for the Color Computer, to work without the interference of a separate operating system such as FLEX. From this comes speed and more workspace for you. Unlike other programs for the Color Computer which are said to be 64K compatible, **VIP Library™** programs are not limited to between 24 and 30K of workspace in 64K. **Library** programs have Memory Sense with BANK SWITCHING to fully use all 64K, thus giving up to 51K with a disk version and up to 53K with a tape version.

Easy To Use

Each **Library** program was carefully designed to be extremely easy to use. Built-in on-screen help tables are at your fingertips, as are menus of all kinds. Every effort is made to use logical, intuitive and easy-to-remember commands. The manuals have been thoughtfully prepared to cover every aspect of the program, and they have complete tutorials to get you going right away. We set the standard!

Lowercase Displays

State-of-the-Art graphics allow instant use of four display colors, and eight lowercase displays featuring descending lowercase letters. You can select from 51, 64 or 85 columns by 21 or 24 lines per screen, with wide or narrow characters in the 64 display. These screens provide a pleasant and relaxing way to perform your tasks, with as much text on the screen as is possible. Each program is easy to learn and a joy to use. We take pride in the stringent testing done to make these programs perform flawlessly. Every feature, every convenience, sleek, simple and elegant.

> *". . . PICTURE getting your instantaneous investment report over the phone, using it in your spreadsheet calculation, generating a report, and writing a memo including that report and data from your database with your word processor, and all this with VIP Library™ programs . . ."*

Total Compatibility

All **Library** programs are compatible. Transfer and use of files between programs is easy and carefree. What's better, when you have learned one program the others will come easy. And every program is the best of its kind available.

The Library Programs

For your writing needs is the **VIP Writer™**, and its spelling checker, the **VIP Speller™**. For financial planning and mathematical calculations you can use the **VIP Calc™**. To manage your information and send multiple mailings there is the **VIP Database™**. For sending all these files to and from home or the office and for talking to your friends you can have the **VIP Terminal™**. Finally, to fix disks to keep all your **Library** files in good repair we offer the **VIP Disk-ZAP™**.

Mini Disk Operating System

The Disk versions each have a Mini Disk Operating System which will masterfully handle from 1 to 4 drives. It offers smooth operation for such features as the ability to read a directory, display free space on the disk, kill files, save and automatically verify files, and load, rename and append files. **Library** programs simply do not have the limitations of BASIC.

Professionalism

The **Library** will grace your work area with the professionalism it deserves. Welcome the **VIP Library™** into your home and office.

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See our line of fine products at the Tom Mix Software booth at RAINBOWfest Chicago.

VIP Writer™

Includes VIP Speller at no additional cost!!

(Formerly Super "Color" Writer II)
By Tim Nelson

RATED TOPS IN RAINBOW, HOT COCO, COLOR COMPUTER MAGAZINE & COLOR COMPUTER WEEKLY

The most powerful and easy-to-use word processor is available in the showpiece and workhorse of the **Library: The VIP Writer™**. Because of its undisputed superiority over all Color Computer word processors, it was selected by Dragon Data Ltd. of England and TANO in the U.S., to be the Official Word Processor for their line of Dragon microcomputers.

The result of two years of research, the **VIP Writer™** offers every feature you could desire from a word processor. It is the most powerful, fastest, most dependable and most versatile. With the hi-res display, workspace and compatibility features built into the **Library** the **Writer** is also the most usable.

". . . Nearly every feature and option possible to implement on the Color Computer. The design of the program is excellent; the programming is flawless . . . Features for the professional, yet it is easy enough for newcomers to master . . . Certainly one of the best word processors available for any computer . . ." October 1983 "Rainbow"

"Word processing with VIP Writer is like driving a high-performance vehicle . . . This Ferarri of a package has more features than Telewriter, Easywriter (for the IBM PC), or Applewriter." October 1983 "Hot CoCo"

The **Writer** will work with you and your printer to do things you always wanted to do. Every feature of your printer can be put to use, every character set, every graphics capability at any baud rate, EVEN PROPORTIONAL SPACING. All this with simplicity and elegance. You can even automatically print multiple copies.

Although all versions feature tape save and load, the disk version provides the Mini Disk Operating System common to the whole **Library**, plus disk file linking for continous printing.

Professional features of particular note:

- Memory-Sense with **BANK SWITCHING** to fully utilize 64K, giving not just 24 or 30K, but up to 61K of workspace with the rompak version and 50K with the disk version.
- TRUE FORMAT WINDOW allowing you to preview the printed page ON THE SCREEN BEFORE PRINTING, showing centered lines, headers, FOOTNOTES, page breaks, page numbers, & margins in line lengths of up to 240 characters. It makes HYPHENATION a snap.
- A TRUE EDITING WINDOW in all 9 display modes for those extra wide reports and graphs (up to 240 columns!).
- FREEDOM to imbed any number of PRINTER CONTROL CODES anywhere, **EVEN WITHIN JUSTIFIED TEXT.**
- Full 4-way cursor control, sophisticated edit commands, the ability to edit any BASIC program or ASCII textfile, SEVEN DELETE FUNCTIONS, LINE INSERT, LOCATE AND CHANGE, wild card locate, up to TEN SIMULTANEOUS block manipulations, word wrap around, programmable tabs, display memory used and left, non-breakable space, and headers, footers and FOOTNOTES.
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32K (Comes with tape & disk) $59.95
(Includes VIP Speller)

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VIP Speller™

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WITH A 50,000 WORD INDEXED DICTIONARY!
By Bill Argyros

Gone are the eyestrain, boredom and fatigue from endless proofreading. **VIP Speller™** is the fastest and most user-friendly speller for your CoCo. It can be used to correct any ASCII file — including **VIP Library™** files and files from **Scripsit™** and **Telewriter™**. It automatically checks files for words to be corrected, marked for special attention or even added to the dictionary. You can even view the word in context, with upper and lowercase. **VIP Speller™** comes with a specially edited **50,000** word dictionary which, unlike other spellers for the CoCo, is indexed for the greatest speed. The shorter your file, the quicker the checking time. And words can be added to or deleted from the dictionary or you can create one of your own. **VIP Speller™** also comes with the **Library's** mini disk operating system for easy disk manipulation.

32K DISK ONLY $39.95
Lowercase displays not available with this program.

VIP™ Library

VIP Calc™

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(Formerly Super "Color" Calc)
By Kevin Herrboldt

You can forget the other toy calcs — The real thing is here! No other spreadsheet for the Color Computer gives you:

- **20 ROWS BY 9 COLUMNS ON THE SCREEN AT ONCE**
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- **WORKS WITH BASE 2, 10, AND 16 NUMBERS**
- **UP TO 512 COLUMNS BY 1024 ROWS**
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- **ON-LINE HELP TABLES**
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There's nothing left out of **VIP Calc™**. Every feature you've come to rely on with VisiCalc™ is there, and then some. You get up to **5 TIMES** the screen display area of other spreadsheets for the Color Computer and Memory-Sense with **BANK SWITCHING** to give not just 24, or 30, but **UP TO 33K OF WORKSPACE IN 64K!!!** This display and memory allow you the FULL SIZE, USABLE WORKSHEETS you require. You also get: User definable worksheet size, up to 512 columns by 1024 rows! * Up to **SIXTEEN VIDEO DISPLAY WINDOWS** to compare and contrast results of changes * **16 DIGIT PRECISION** * Sine, Cosine and other trigonometric functions, Averaging, Exponents, Algebraic functions, and **BASE 2, 8, 10 or 16** entry * Column and Row, Ascending and Descending **SORTS** for comparison of results * **LOCATE FORMULAS OR TITLES IN CELLS** * Easy entry, replication and block moving of frames * Global or Local column width control up to 78 characters width per cell * Create titles of up to 255 characters per cell * Limitless programmable functions * Typamatic Key Repeat * Key Beep * Typeahead * Print up to 255 column worksheet * Prints at any baud rate from 110 to 9600 * Print formats savable along with worksheet * Enter PRINTER CONTROL CODES for customized printing with letter quality or dot matrix printer * Combine spreadsheet tables with **VIP Writer™** documents to create ledgers, projections, statistical and financial reports and budgets.

Both versions feature Tape save and load, but the disk version also has the Mini Disk Operating System of the entire **Library**.

32K (Comes with tape & disk) $59.95
32K has no hi-res displays, sort or edit.

Check These Library Prices:

- **Fully CoCo 2 Compatible**
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- **Mini Disk Operating System**
- **Compatible With All Printers**

VIP Terminal™

(Formerly Super "Color" Terminal)

RATED BEST IN JANUARY 1984 "RAINBOW"

RAINBOW CERTIFICATION SEAL

By Dan Nelson

From your home or office you can join the communication revolution. The **VIP Terminal™** opens the world to you. You can monitor your investments with the Dow Jones Information Service, or broaden your horizons with The Source or Compuserve, bulletin boards, other computers, even the mainframe at work.

For your important communication needs you've got to go beyond software that only lets you chat. You need a smart termnal so that you can send and receive programs, messages, even other **VIP Library™** files. **VIP Terminal™** has "more features than communications software for CP/M, IBM and CP/M 86 computers." Herb Friedman, Radio Electronics, February 1984.

FEATURES: Choice of 8 hi-res lowercase diplays * Memory-Sense with BANK SWITCHING for full use of workspace * Selectively print data at baud rates from 110 to 9600 * Full 128 character ASCII keyboard * Automatic graphic mode * Word mode (word wrap) for unbroken words * Send and receive **Library** files, Machine Language & BASIC programs * Set communications baud rate from 110 to 9600, Duplex: Half/Full/Echo, Word length: 7 or 8, Parity: Odd/Even or None, Stop Bits: 1-9 * Local linefeeds to screen * Save and load ASCII files, Machine Code & BASIC programs * Lowercase masking * 10 Keystroke Multiplier (MACRO) buffers to perform repetitive pre-entry log-on tasks and send short messages * Programmable prompt or delay for send next line * Selectable character trapping * Send up to ten short messages (KSMs), each up to 255 characters long, automatically, to save money when calling long distance.

All versions allow tape load and save of files and KSMs, but the disk version also has the Mini Disk Operating System common to the **Library**.

32K (Comes with tape & disk) $49.95

(Tape comes in 16K but without hi-res displays)

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VIP Database™

(Formerly Super "Color" Database)

INCLUDES MAIL MERGE CAPABILITIES TOO!

By Tim Nelson

This high speed MACHINE LANGUAGE program fills all your information management needs, be they for your business or home. And it does so better than any other database program for the Color Computer, featuring machine code, lowercase screens and mailmerge capabilities. Inventory, accounts, mailing lists, family histories, you name it, the **VIP Database™** will keep track of all your data, and it will merge **VIP Writer™** files.

The **VIP Database™** features the **Library** Memory Sense with BANK SWITCHING and selectable lowercase displays for maximum utility. It will handle as many records as fit on your disk or disks. It is structured in a simple and easy to understand menu system with full prompting for easy operation. Your data is stored in records of your own design. All files are fully indexed for speed and efficiency. Full sort of records is provided for easy listing of names, figures, addresses, etc., in ascending or descending alphabetic or numeric order. Records can be searched for specific entries, using multiple search criteria. With database form merge you may also combine files, sort and print mailing lists, print "boiler plate" documents, address envelopes - the list is endless. The math package even performs arithmetic operations and updates other fields. Create files compatible with the **VIP Writer™** and **VIP Terminal™**. Unlimited print format and report generation with the ability to imbed control codes for use with all printers.

As with all other **Library** programs, the **Database** features the powerful Mini Disk Operating System.

32K DISK $59.95

64K Required for math package & mail merge

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VIP Disk-ZAP™

(Formerly Super "Color" Disk-ZAP)

RAVED ABOUT IN THE APRIL 1983 "RAINBOW!"

RAINBOW CERTIFICATION SEAL

By Tim Nelson

Your database file disk, form letter disk, or BASIC program disk goes bad. An I/O error stops loading, or even backing up of the disk. Weeks, even months of work sit on the disk, irretrievable. Now catastrophic disk errors are repairable, quickly and with confidence, using the **VIP Disk-ZAP™**. It is the ultimate repair utility for simple and quick repair of all disk errors. Designed with the non-programmer in mind, the **VIP Disk-ZAP™** will let you retrieve all types of bashed files, BASIC and Machine Code programs.

This high-speed machine code disk utility has a special dual cursor screen display to look at the data on your disk. You are able to: Verify or modify disk sectors at will * Type right onto the disk to change unwanted program names or prompts * Send sector contents to the printer * Search the entire disk for any grouping of characters * Copy sectors * Backup tracks or entire disks * Repair directory tracks and smashed disks * Full prompting to help you every step of the way * 50-plus page Operators Manual which teaches disk structure and repair.

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All Disk Programs are also available on 3" Diskettes for the Amdek Color AMDISK-III Micro-Floppy Disk System for an additional $3.00 each.

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The Computer As Teacher

By Michael Plog, Ph.D.
RAINBOW Contributing Editor

Well, it has finally happened. I heard a rumor that the first college credit course is going to be offered via microcomputer and modem. I cannot give you any more details, except that the course is being offered through some college in New York, and the student also lives in New York.

This is an exciting event, and if any of you have any more information about it, please contact me. Send any information you have to my address below.

This type of instruction can be considered "remote." The student and teacher are separated by distance (possibly time as well). Actually, remote education has been around for a while. The first major attempts at remote education were done using television broadcasts. The teacher was in a studio (sometimes with a class present) and the remote students were in another classroom, or even at home. Lectures were taped and played several times to different sets of students. Of course, if you missed something important, you could always watch the tape again.

Most television instruction died out in the early 1970s. It seems the interest was not powerful enough. There are still a few cases of remote television instruction around. Mostly, this type of instruction is used with adults, not elementary or secondary students. I know of one example, being conducted even as you read this, of adult learners watching a television tape, and then completing laboratory exercises. The subject matter of the remote teaching is microcomputers.

The lack of immediate feedback is one major feature tending to make this form of instruction less powerful for younger learners. Also, motivation is generally accepted as higher in adult learners than in younger ones. It takes a high degree of motivation to struggle through a lecture without being able to have questions answered.

There is an example of remote education being used with high school students, which attempts to avoid the problem of lack of immediate feedback. The teacher is in one location, with a television camera. Students are in other locations, but also with a television camera. Students can see the teacher, and the teacher can see the students. When a student raises a question, the teacher can see a hand in the air and hear the question. Four small high schools have formed a consortium to offer courses which would otherwise not be available to students. The success of this experimental program is not known at this time. It may be a flop; it may be the best thing since sliced bread.

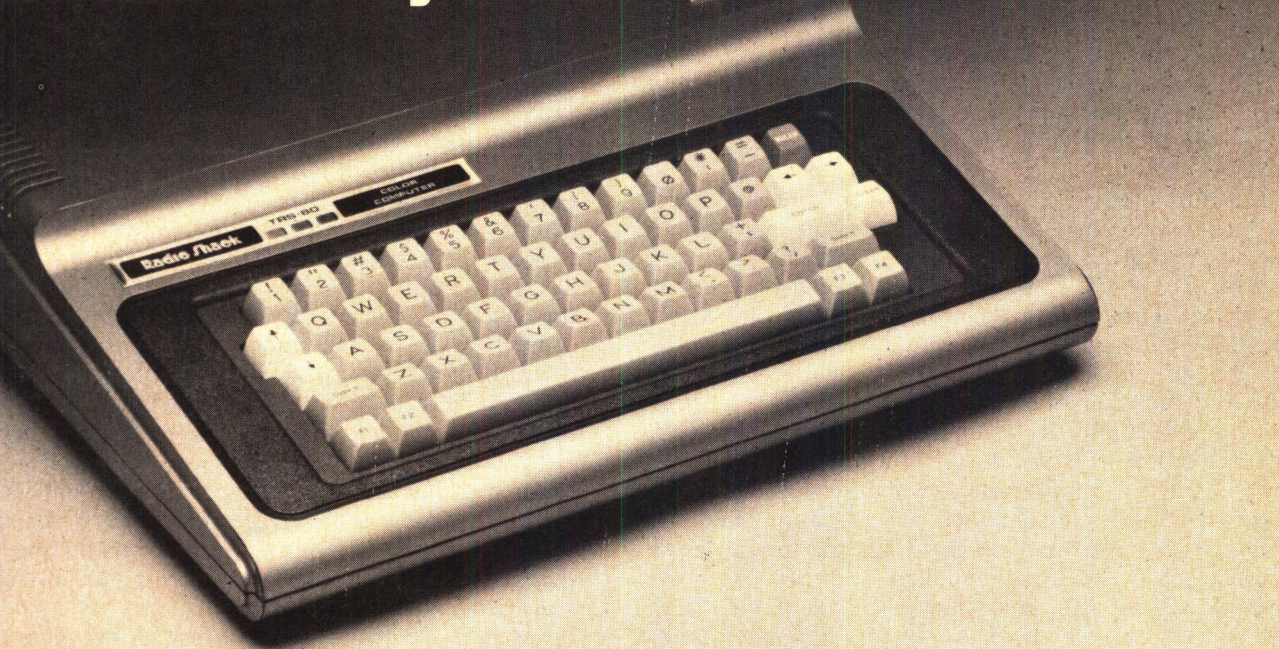
Now, how can microcomputers fit with this concept of remote education? Just redefine remote a little bit, to mean a student working on something without a teacher present or helping. Students are working with a machine, following instructions given by the machine. Correct answers are rewarded; incorrect answers are caught immediately. When finished, the student turns off the computer and puts the diskette away.

Why should the student be in a classroom for this? Why couldn't the student work at home? The answer is that the student could work at home very easily, and has no need to be in a school building. With a modem attached to a home computer, lessons could be delivered each day and student work returned to the school. A single teacher could deal with many more students, since the time for each student would be reduced dramatically. In fact, the same instructions could be delivered to all students. Teachers would only have to

---

(Michael Plog received his Ph.D. degree from the University of Illinois. He has taught social studies in high school, worked in a central office of a school district, and currently is employed at the Illinois State Board of Education.)

The HJL-57 Keyboard



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The ergonomically-superior HJL-57 has sculptured, low profile keycaps; and the three-color layout is identical to the original CoCo keyboard.

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Compare Performance.

Offering more than full-travel, bounce-proof keyswitches, the HJL-57 has RFI/EMI shielding that eliminates irritating noise on displays; and four user-definable function keys (one latchable), specially-positioned to avoid inadvertent actuation.

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Only $79.95, the HJL-57 is available for immediate shipment for either the original Color Computer (sold prior to October, 1982) or the F-version and TDP-100 (introduced in October, 1982), and the new 64K CoCo. **Now also available for CoCo 2.**

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spend time on the instructions for the day and problem students.

This exact situation has been predicted for education in the future. Students will be working at home, with only occasional visits to a school building. Many science fiction stories have been written using this theme. Serious futurists have discussed such a possibility as tomorrow's educational reality.

If applied to an entire school, the possibilities can stagger the imagination. Instead of one teacher for less than 30 students, a single teacher can "process" possibly a hundred students. There will be no need for principals at all. Teachers can work at home also — they have no real need to be in a school building any more than students. Teachers can attend a curriculum conference at the same time they are collecting test results from students.

On the other hand, the future may not look like this at all. My personal belief is that future schools will not be conducted entirely via modems and computers. Some people disregard all uses of computers for education; they are wrong. Wrong also are those that think the computer can replace teachers and school buildings.

So far, all past attempts at remote education on a large scale (classroom or building) have failed. The failure has not been the fault of technology. It is simply that such a view of schooling disregards two things — human behavior and an understanding of education. Let's take the easiest one first, an understanding of education.

> *"Some people disregard all uses of computers for education; they are wrong. Wrong also are those that think the computer can replace teachers and school buildings."*

There are different types of learning. Some learning is simple knowledge acquisition. An example of this type of learning is the date the Constitution was written, or how to save a program on tape using commands on the Color Computer. Much of the "drill and practice" programs sold for educational use represent simple acquisition of knowledge. Here, the use of a computer for education really shines. Students learn facts from a computer as well (or maybe even better) as from a human teacher.

There are other types of learning, however. In addition to learning that Jefferson was the major author of the Constitution, we also want students to learn the use of the concept of democracy. This is a "higher level" of learning; one that involves a synthesis (or putting together) of many facts and applying them within a framework of a philosophy.

The computer is not a good tool for learning the principles of how things operate. The computer is an extremely useful educational tool for learning how things operate, but not very good for learning why things operate as they do. A human needs to monitor higher level learning and explain the "why" of things — from social systems to electronic components of the computer.

Consider for a moment what psychologists term the "Ah response." You have experienced this, but perhaps forgotten the last time. Maybe you have seen it work in others, especially children. The "Ah" response is a simple way of expressing a mental click that happens when understanding is achieved. The eyes open larger, the mouth typically opens, eyebrows go up, there is an intake of breath, and posture changes. The typical verbal response is "Ah" or "Ooooh." The learner has "got it."

Teachers see this response often. A computer cannot determine if the student has conquered (there is no better term) a concept.

Earlier, the term human behavior was used as a reason why computers will never totally replace teachers. The major part of the complexity of human behavior that safeguards the teaching profession is that humans are gregarious; we need the social contact of other humans. Part of schooling is learning social skills — which can only be practiced with other humans around.

Humans take different routes to get to the same learning. At present, no one knows enough to account for the different questions students ask about a single topic. A human teacher can use reason to determine the best way to take a student from one point to another. A computer can only use logic, which is often inadequate. (That seems to be the major difference between organic intelligence and metallic intelligence — computers are logical, but not reasonable.)

Lest you get the wrong impression from my words, let me state that computers have many roles to play in schooling of the future. Computers now play a limited role, which should be expanded. Still, the computer will never replace the need for a human teacher in classrooms.

Computers should be used differently at different levels of learning. For simple acquisition of factual knowledge, computers can be used in a direct manner. For more complicated learnings (i.e., synthesis or analysis), computers should be used to create simulations and more fully cement the concepts.

The thoughts expressed here are mine, and I have no copyright on truth. If you want to comment on anything I have said, please write me at 829 Evergreen, Chatham, Ill., 62629. I would enjoy hearing from you. Also, I will be part of a forum coordinated by Dr. Charles Santee at the Chicago RAINBOWfest. I hope to see you there, to discuss these and other ideas.

We have just begun with computer applications in education. There is a long way to go. As a humanist, I believe we have the capability to get there, but also believe the journey is as important as the destination. Keep going.

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```
TYPE Node = RECORD
     Next : ^Node;
     NodeName : String(15);
```

```
TYPE Month = (Jan, Feb,..
```

```
MthDys : ARRAY [Month] OF 28..31;
```

DEFT
PASCAL

```
WITH ThisNode DO
     Next := Next^.Next;
```

```
READ (A,B);
WRITELN ('RESULT', 3.2E5*SIN(A));
```

```
CASE ThisMonth OF ...
```

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SCHOOL IS IN THE HEART OF A CHILD

4K

Putting Things In Order

Why do we stop teaching our children when they start school? It's usually gradual; it's mostly unconscious, but by the time our kids are snuggly settled in the primary grades, we turn over the "teaching" to the teachers, and expect that the chore of learning will only occupy the school day.

— Laran Stardrake

By Fran Saito & Bob Albrecht
RAINBOW Contributing Editors

"School Is In The Heart of a Child" is for parents of quite young children. We want to help you work and play with your three- to eight-year-old child and learn to use computers as a joyful family experience. We want to suggest ways to incorporate the home computer as another means to encourage your child's independence, growth, and control over his own life. See the pride on her face as she directs the computer to do what she with deliberation selects. See her head gears switch to "on" as she progresses step-by-step with your presence and caring direction.

We will explore (we hope, with *your* help) the following:

- Specific "teaching" techniques so that the discovery can be the child's own.
- Critical evaluation of software based on extensive playtesting in family and related enviroments.
- Additional resources to consult: books, magazines, software publishers, networks, etc.
- Suggestions for interludes and fun times away from the computer (a must): call the librarian for specific information; watch a TV program together and discuss it; work together as volunteers in a community project; take a spring (or fall or winter or summer) awareness walk . . .
- Whatever we learn from families we work with in Menlo Park or from you, our readers. Let's pool our knowledge. Let's share our experiences as we all learn from our children.

We also provide small programs you can type in and use right now.

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(Fran Saito holds a degree in education from the University of Hawaii and has taught preschool and elementary students. She feels her inspiration comes from Mariko, her five-year-old daughter. Well-known author Bob Albrecht also writes the "GameMaster's Apprentice" feature for THE RAINBOW *each month.)*

We Love The Letters!

Thanks again, people, for sending us letters about your experiences with your kids and your CoCo. More, please. If it is okay for us to reprint all or part of your letter, please include permission when you write to us.

Here is a letter from Carol A. Callaghan, 2806 Richdale Road, Wilmington, DE 19810.

Dear Fran and Bob:

Your column in THE RAINBOW is great! I have a nine-year-old daughter who is just getting interested in our Color Computer. My husband is a management consultant specializing in information systems, and I have two teenagers (14-year-old boy, 16-year-old girl) who are taking computer courses in high school. Naturally, the main users of the computer are my son and my husband, but the rest of us are managing to get some "computer time," too.

My daughter became interested in computers because her fourth-grade class has a TRS-80 Model I, but no one knew what to do with it. I hated to see the computer in the class going to waste, so I started working with the class one day a week. I recognized the name, Bob Albrecht, from the book I'm using to help me with some of my lessons, *TRS-80 Level II BASIC*. It is a bit beyond the kids, so I water it down and also use the Radio Shack book from their first course, *Introduction to BASIC*.

I started with a vocabulary session — explaining the need to know the "language" (input, output, and memory) before they can do anything. I gradually added to this list over a two-month period and have covered about four chapters in *TRS-80 Level II BASIC* and about six chapters in the Radio Shack *Introduction to BASIC*.

Since this is a gifted class, I also did a bit with binary for them, taking the first part of my information from a six-grade math book, and the rest from the "Girl Scout Badge Book."

I feel very much alone as I approach the class, little support from the teacher or school (they are deeply into Apples in our school district), and, of course, this is all pretty new to me, too. So your column is great. I do enjoy working with the class, and several of the boys are very interested. One got a TI for Christmas, and he felt very comfortable trying things his father was not sure of — he said his father asked "How do you know all these things?" and that made my whole "program" worthwhile!

Now to get back to the CoCo and how my daughter and I have used it at home. She had a real problem with spelling, and since I felt that was really important, we ended up arguing instead of working constructively. Finally, I gave up trying to help and ordered a spelling program, *Spelling Teacher*, from Custom Software Engineering, Inc., 807 Minuteman Causeway (D-2), Cocoa Beach, FL 32931, (305) 783-1083. It was advertised in December RAINBOW, and when I called and ordered it, it came within two or three days. It was only $12.95 for tape, but it was easily copied onto disk. The ad in the magazine said "Up to 200 of their spelling words stored on tape or disk are presented in four lively study modes including a scrambled word game."

Colleen's book has 32 lessons with 20 words each, and I keyed all of them in one night, calling them *SPELL1*, *SPELL2*, *SPELL3*, etc. My son copied all of that onto a backup diskette for me, and we have had no problems with the program. It has several screens (one to build the lessons, and one to work with individual lessons in a variety of formats), and to my surprise the format the children like best is "scrambled word." The program first displays the word and lets you key it in, with the word displayed for you. It flashes the word for maybe 10-15 seconds, then says "You try it" and the word disappears. The next time the word flashes only two-five seconds and you try it again. Then it shows the word with the letters scrambled, and you have to try to spell the word correctly. I think it beeps if you misspell the word as you are going along. It does the usual grading. Colleen loves to get all 20 correct, and her spelling scores have improved in school. A plus was that my son, who is a freshman in high school, also uses the program. We are now looking for a vocabulary program for both English and foreign language lists! Any suggestions? I have also ordered an SAT program from Emmons Software in New Hampshire, but that hasn't come yet. I figure that if the children think of using the computer as fun, they may spend more time going over lists of spelling or vocabulary words or perhaps working on review for the SAT (my oldest daughter is a junior in high school).

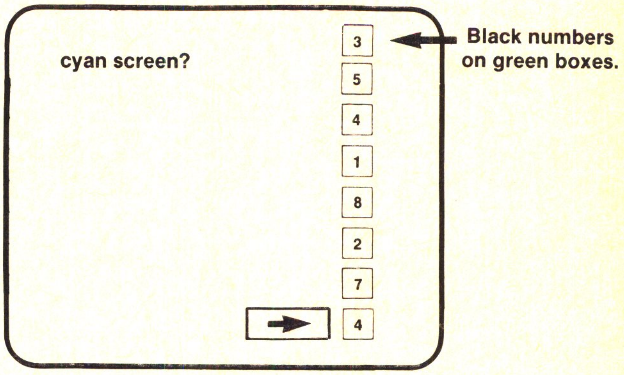
Sincerely,
Carol A. Callaghan

Thanks, Carol. We will send you a small stuffed dragon and a copy of Bob's book, *TRS-80 Color BASIC*.

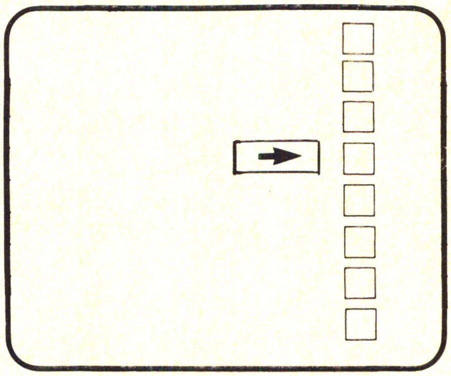
Storyboarding

We will storyboard ideas for programs for you to write. If you write these programs and try them with kids, please share your experiences with us and with other RAINBOW readers.

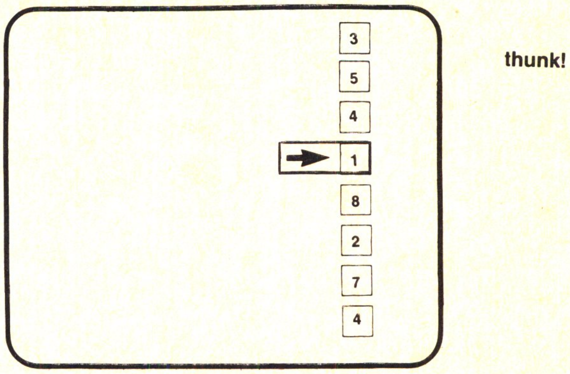
How about some "putting things in order" games? First, a game in which you put number blocks in order with the smallest number on top and the largest on the bottom. It might begin like this.



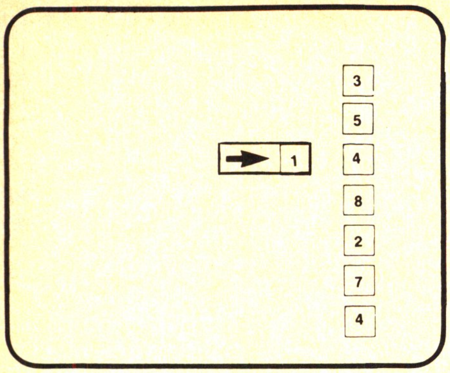
Use the keyboard arrows keys [↑↓→←] to move the on-screen arrow (->) to the block you want to move to the top. Let's move it to the block with the number one. First, use the arrow key to move it up until it is on the same line.



Now move it right until it "thunks" into the block. Use the keyboard right arrow key to do this.

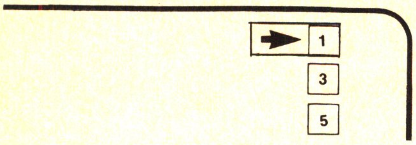


Use the left arrow key to move the screen arrow and the block to the left. When you do this, all the blocks above the one block fall down one place:

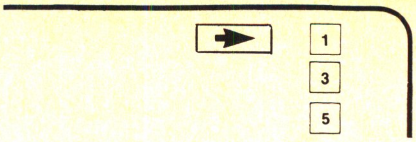


There is now room at the top.

Move block one up the top and then right into position.



It looks like we need a way to tell the screen arrow to "let go." What key shall we use? L for "let go?" We choose the Space Bar. Press it and the screen arrow lets go and backs up one space.



Continue moving blocks to the top until they are in order, one to eight. Then give a nice reward.

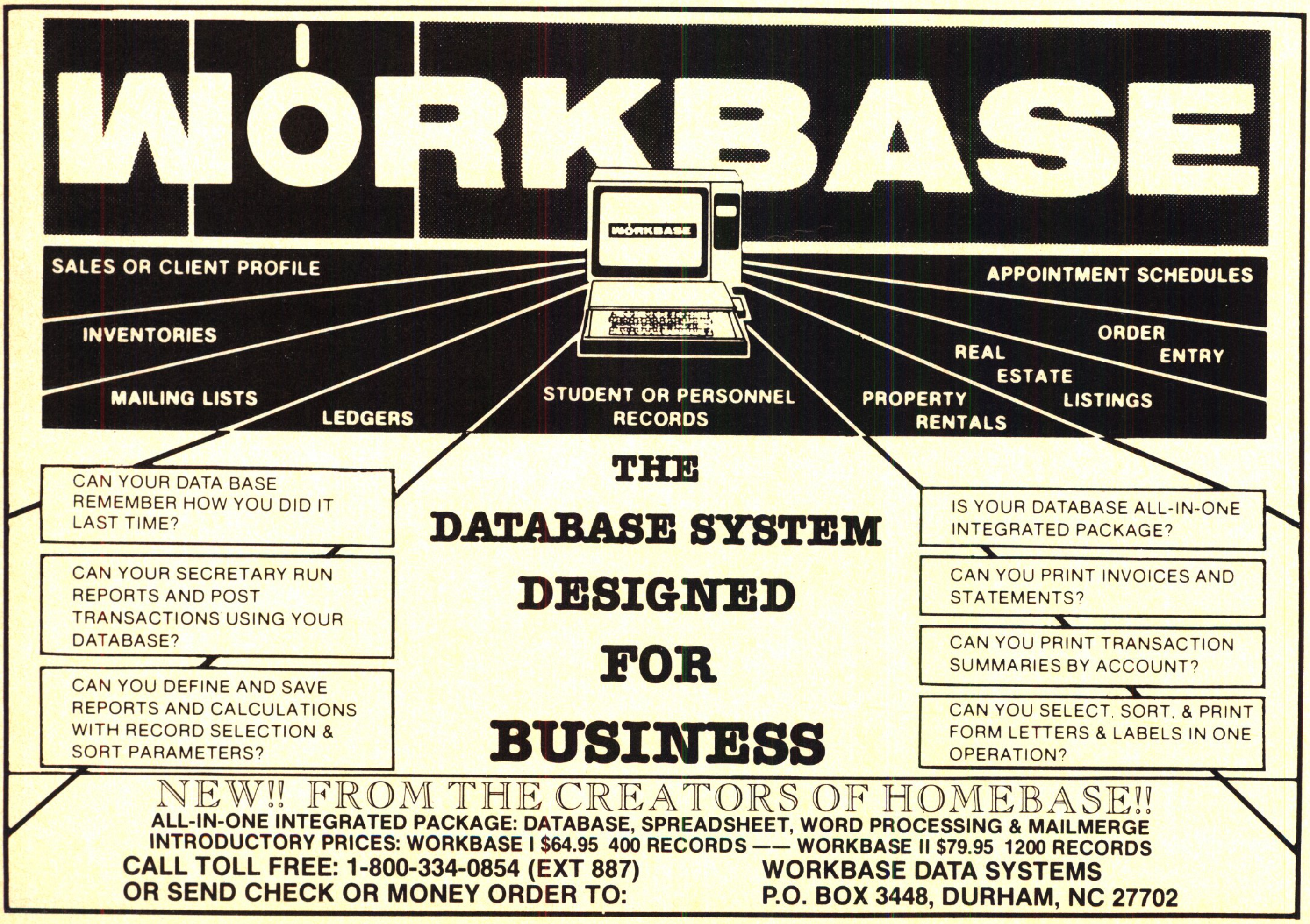
Variations

- Instead of the numbers one to eight, use a selection of eight numbers from a larger set: one to 12; or one to 20; or one to 99; or whatever set you choose.
- Instead of numbers, select eight letters of the alphabet or eight three-letter words.
- Put these shapes in order according to the number of sides: triangle, rectangle, pentagon, hexagon, octagon.
- Instead of the screen arrow, use a solid graphics character as a "magnet" that attaches to the number or letter to be moved.

Stop On A Number

Okay everyone, try our reaction time games. Here is the first one.

```
100 REM**REACTION TIME SCH 6-1
```



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```
200 REM**TELL HOW TO PLAY
210 CLS
220 PRINT "HOW FAST ARE YOU?"
225 PRINT
230 PRINT "WHEN I START COUNTING
,"
235 PRINT
240 PRINT "PRESS SPACE TO STOP M
E."
245 PRINT: PRINT
250 PRINT "PRESS ANY KEY AND I'L
L BEGIN."
260 IF INKEY$="" THEN 260
300 REM**CLEAR SCREEN, RND DELAY
310 CLS 8
320 TD = RND(1000) + 1000
330 GOSUB 910
340 K$ = INKEY$
400 REM**COUNT, SPACE STOPS IT
410 N = 0
420 N = N + 1
430 PRINT @239, N;
440 TD = 1
450 GOSUB 910
460 IF INKEY$<>" " THEN 420
500 REM**TELL HOW TO PLAY AGAIN
510 PRINT @448, "TO PLAY AGAIN,
PRESS ANY KEY."
520 IF INKEY$="" THEN 520 ELSE 2
10
900 REM**TIME DELAY SUBROUTINE
910 FOR ZZ=1 TO TD: NEXT
920 RETURN
```

ENTER and *RUN* the program. It begins like this.

```
HOW FAST ARE YOU?

WHEN I START COUNTING,

PRESS SPACE TO STOP ME.

PRESS ANY KEY AND I'LL BEGIN.
```

Of course, read the words on the screen slowly and carefully and point out the Space Bar. Go ahead, press a key —any key except BREAK or SHIFT by itself.

Flash! For a little while, the screen is orange and empty. Then suddenly, numbers appear near the center of the screen: one, two, three, four and so on. Press the Space Bar to stop the computer.

What number did you stop on? On a slow day, here is what we saw.

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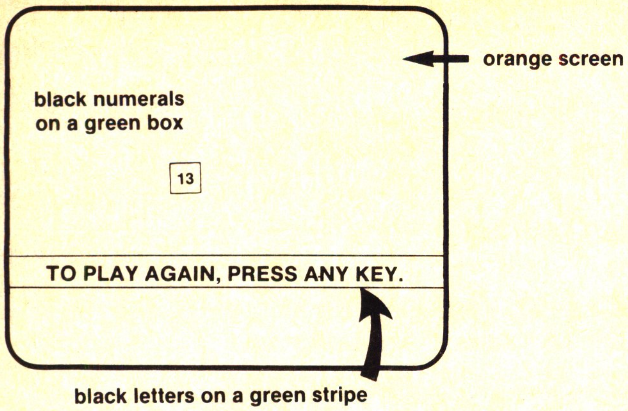
orange screen
black numerals on a green box
13
TO PLAY AGAIN, PRESS ANY KEY.
black letters on a green stripe

Press a key and play again. Can you stop the computer on 10? On seven? What is the lowest number on which you can stop the computer?

Well, that's one game. Now change the time delay in Line 440. Make it quite big.

440 TD = 500

Play again. But this time, first choose a number to stop on. Put your fingers near the Space Bar. When you see your number, press it fast! Stop on seven, eight, or nine. Then try some bigger numers: 12, 15, or 21.

When you can stop on your number every time, reduce the time delay.

440 TD = 300

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HAVE YOU HEARD OF US?
Every advertiser compares their product to "THE OTHER GUY'S." WHY IS THAT? It's because we make the best product for the best price. Other companies claim their general ledgers will handle at least 500 accounts and 1000 data entries on a 64k system. Look and compare "KEEP-TRAK" with it's 16k version which holds 740 entries. Our 32k version handles 900 accounts with over 2400 entries. (Disk Only)
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Play again. When you can stop on your number every time, reduce the time delay again, etc. How small can you make TD and still stop on your number every time? How small can you make TD and still stop on your number about half the time?

Stop On A Letter

Tired of numbers? Try stopping on a letter.

```
100 REM**STOP ON LETTER SCH 6-2
200 REM**TELL HOW TO PLAY
210 CLS
220 PRINT "WHEN I DO MY ABC'S,"
225 PRINT
230 PRINT "PRESS SPACE TO STOP M
E."
235 PRINT: PRINT
240 PRINT "PRESS ANY KEY AND I'L
L BEGIN."
250 IF INKEY$="" THEN 250
300 REM**CLEAR SCREEN, RND DELAY
310 CLS 8
320 TD = RND(1000) + 1000
330 GOSUB 910
340 K$ = INKEY$
400 REM**ABC'S, SPACE STOPS IT
410 FLAG = 0
420 FOR LC=65 TO 90
430 : PRINT @239, CHR$(LC);
440 : TD = 1
450 : GOSUB 910
460 : IF INKEY$=" " THEN LC=90:
FLAG=1
470 NEXT LC
480 IF FLAG=0 THEN 420
500 REM**TELL HOW TO PLAY AGAIN
510 PRINT @448, "TO PLAY AGAIN,
PRESS ANY KEY."
520 IF INKEY$="" THEN 520 ELSE 2
10
900 REM**TIME DELAY SUBROUTINE
910 FOR ZZ=1 TO TD: NEXT
920 RETURN
```

How early in the alphabet (close to A) can you stop? You will see that the CoCo flashes letters more rapidly than it flashed numbers. When it gets to Z, it starts over at A.

Now change the time delay (TD) in Line 440. Make it quite big.

440 TD = 500

Play again and pick a letter to stop on. When you see it, press the Space Bar so the CoCo stops on *your* letter.

We suspect lots of kids will sing the alphabet song as the CoCo flashes the letters. All together now, "A, B, C, D, . . ."

Koala Krusade

We have received several letters from people who would like a CoCo version of the Koala Pad. Thanks — we need lots more letters to take to the Koala people to convince them there is a CoCo market. We are convinced that touch pads such as the Koala Pad are a major breakthrough in using computers — especially for younger kids. Send more letters to:

- Koala Krusade, P.O. Box 310, Menlo Park, CA 94026. If you want to contact Koala directly, write to:
- Koala Technologies Corporation, 3100 Patrick Henry Drive, Santa Clara, CA 95050.

Playtesting Impressions

When we first began this project, the first software we received for playtesting was *Early Games* from Counterpoint Software. We have watched several kids play with these games. Here are some comments by one of our playtest supervisors, Sheri Bakun.

Early Games is an excellent introduction to the computer for the pre-school child. It provides practice in learning skills in an environment in which the child is in control.

There are nine activities including matching numbers and letters; simple addition and subtraction; counting, and drawing. Each activity is represented by a picture on the screen. These pictures are shown one after another until the child selects one by pressing the longest key on the keyboard (the Space Bar), while the picture of the chosen activity is on the screen. Switching to a different activity is easy. First, press the red BREAK key. The current activity ends and pictures of the choices are shown until the child selects another.

When playing for the first time, the children all smiled with delight each time they pressed the red key. The sense of power they felt at being able to control their choices so easily and quickly was clearly evident.

> "Early Games *is an excellent introduction to the computer for the pre-school child. It provides practice in learning skills in an environment in which the child is in control."*

Early Games includes several matching games. In one the child matches the very large uppercase letter shown on the screen by typing the corresponding key on the keyboard. Another requires matching the numbers zero through nine. In the shape matching game, the child types the number of the one different shape out of the four shown. Kids who watch "Sesame Street" know the song to sing with this activity!

For the child learning to count and to recognize numbers, there is a counting game in which one to nine colored blocks are shown. Most pre-schoolers will want to touch the screen when counting the larger numbers in this game and also in the addition game. The addition and subtraction games also use colored blocks and will interest the older pre-schoolers.

The alphabet game and another game, in which an adult types in a name for the child to reproduce, are the weakest parts of *Early Games*. The name game does not provide help for wrong answers and can be frustrating.

The ABC game did not interest the children I observed; not one continued beyond the letter "F." The children all know the ABC song but would have to sing it each time to find the next letter. They often passed the one they needed and then would need to start over. Letter recognition has obvious value but sequencing is probably a little advanced for the younger pre-schoolers.

Children playing the math games need to be able to point closely to or touch the screen. The drawing game interested the children. It appears to have magical qualities for it is not easy for the child (or an adult for that matter) to anticipate which key will draw where. A keyboard template, use of the joystick, or at least some written documentation would help this game immensely, since the idea is a good one.

Early Games looks very good. We will continue to use it in order to find out if it has "staying power." *Early Games* is available on cassette or disk for a 16K CoCo with Color BASIC. Please note that Extended Color BASIC is *not* required. It costs $29.95 for either version, cassette or disk, from Counterpoint Software, Inc., Suite 218, 4005 West Sixty-fifth Street, Minneapolis, MN 55435.

DragonSmoke

We recommend a new magazine:

Family Learning, 19 Davis Drive, Belmont, CA 94002. Phone (415) 592-7810. Regular subscription $18/year (6 issues). Charter subscription $9.95/year (6 issues).

This is not a computer magazine — don't confuse it with *Family Computing*. The first issue includes an insert called "The Family Learning Guide: Home Computing." Interesting stuff, although we completely disagree with the article called "The Best Buy." When you read it, you will see why.

We also recommend a book: *Buy A School For Your Home* — Judy Lower, Ed Neil, and Tim Finger. From Reston Publishing Company, 11480 Sunset Hills Road, Reston, VA 22090.

Although this book focuses on software for Atari computers, we strongly recommend it to anyone who wants to learn about using computers with kids, three to 13 years old. Part I (112 pages) has information useful to CoCo users. Here are the chapter titles:

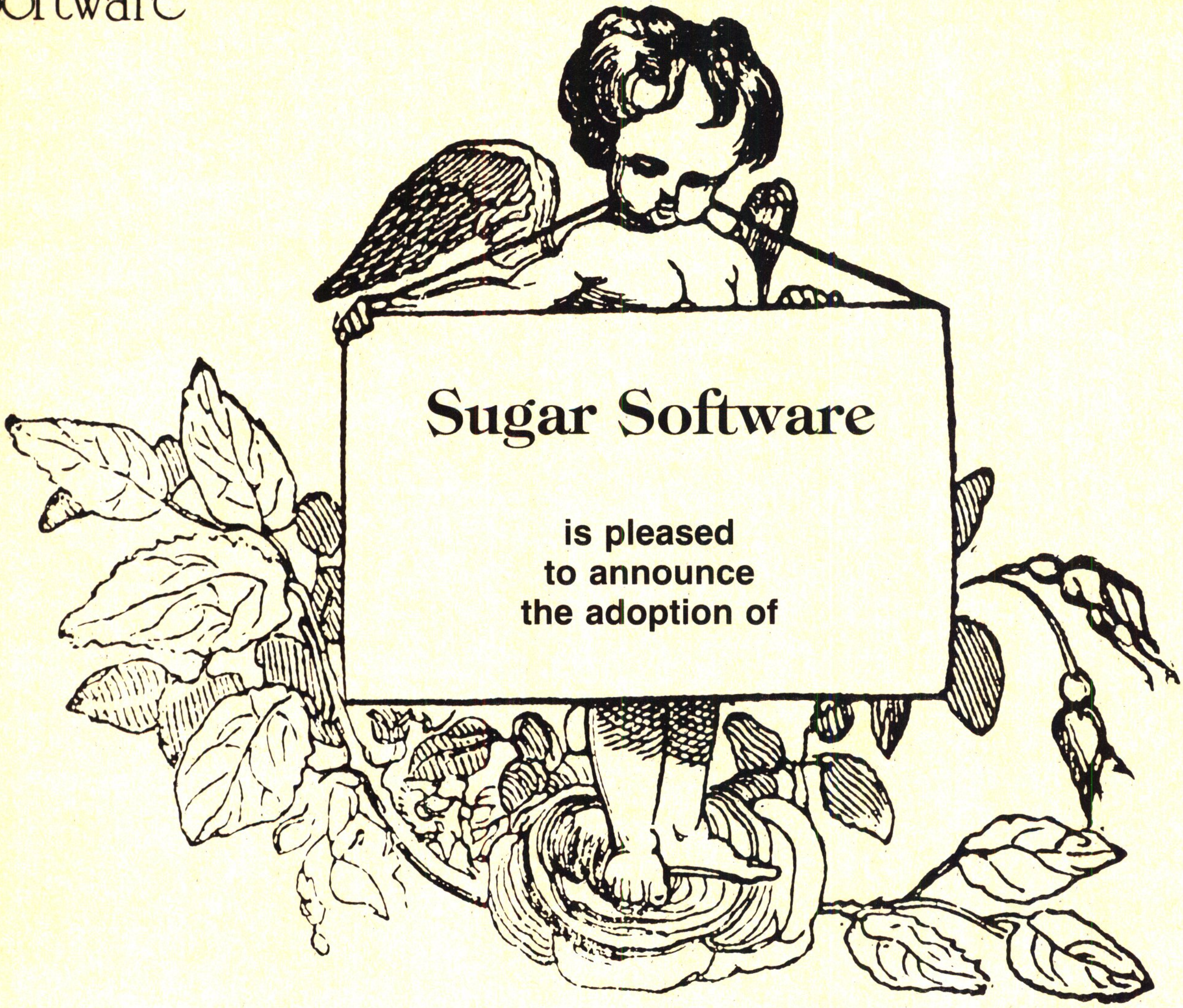
1) Increase Your Learning Power
2) The ComputerKid Project
3) Buyer's Guide
4) Learning Basics with the Computer: Preschool
5) Learning Basics with the Computer: Grades one-three
6) Learning Basics with the Computer: Grades four-six
7) Inside Arcade Games
8) Adventuring on the Home Computer
9) More Adventuring at Home
10) The Family That Plays Together, Learns Together

Part II has evaluations of more than 100 pieces of educational and recreational software for Atari computers. Some of this software is also available for the CoCo.

HELP!

If your home has a kid, three- to eight-years-old, and a CoCo, please share your experiences in using your CoCo with your child. If you write to us, please tell us if it is okay to print all or part of your letter in this column. Mail to P.O. Box 310, Menlo Park, CA 94026.

Sugar Software



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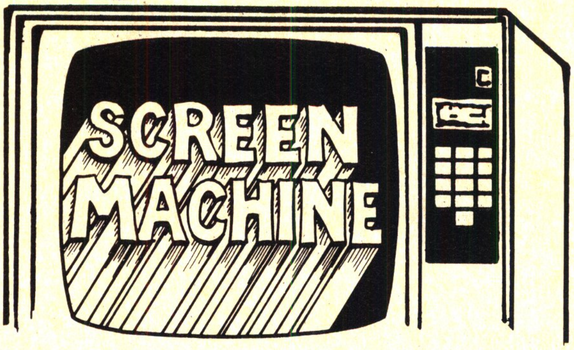

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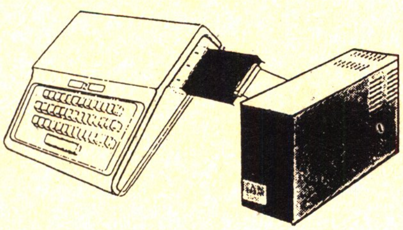

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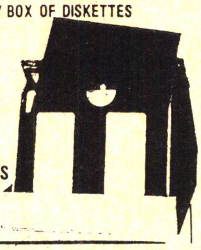

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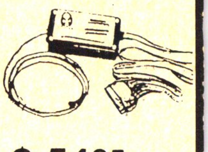

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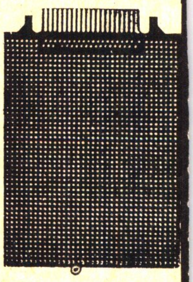

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Miss Liberty

By Brad Tobias

Our school system is small but seven of the 30 faculty members now have Color Computers at home. I have been the instructor for the teacher in-service computer class this year and have had a great time. I'm proud to have introduced the CoCo to our school.

I was asked by one of our third-grade teachers to do something with the computer to help her in her fund raising efforts for the Statue of Liberty.

I decided to print a picture of Miss Liberty using the *Printer Art* program from the November 1983 issue of THE RAINBOW. I got out my graph paper and quickly realized that this is no easy task. Bless you Mr. Himowitz! More than 20 hours later I finished writing the code. I decided to enter the code using my *VIP Writer* word processor. My first copy was a shock. Miss Liberty had a mustache! Making the necessary changes took several more hours but at last I was pleased.

The third-grade teacher was pleased and requested 30 copies to be placed throughout the buildings. I like to think that this project is helping our school reach the $1,000 goal.

The following changes were made in the format parameters of the *VIP Writer* to properly print the picture using either the DMP-200 or CGP-115: *TM1, PL200, LM4, RM80, FL0, BM190.* Be sure the CGP-115 is in the 80-character mode. I selected green and am most happy with the results.

The enclosed code will work well with any word processor or a standard typewriter providing the paper is long enough.

Perhaps other schools or groups can use this picture to help raise funds for the restoration of America's best known symbol of freedom and liberty.

(Bradley Tobias, an elementary school teacher at Mt. Arlington, N.J., is also the instructor of the teacher in-service classes on the Color Computer. He finds the CoCo an exciting educational tool and an invaluable aid in record keeping.)

To create the drawing below, run the *Printer Artist* program (from the November 1983 RAINBOW) and type in the characters as you see them listed here, one line at a time. For example, if a line reads "23sp 16M 14:" you should strike the space bar 23 times, strike the 'M' key 16 times and strike the colon key 14 times.

LINE:

1. 23sp, 1x
2. 22sp, 1x
3. 19sp, 1x, 1sp, 2x
4. 17sp, 5x
5. 14sp, 1x, 1sp, 1x, 4sp, 1x
6. 14sp, 1x, 1sp, 1x, 3sp, 1x
7. 13sp, 1x, 1sp, 1x, 3sp, 1x, 1sp, 1x
8. 12sp, 1x, 6sp, 2x
9. 11sp, 1x, 8sp, 1x
10. 11sp, 1x, 8sp, 1x, 11sp, 5x, 2sp, 1x, 3sp, 1x, 4sp, 1x, 4sp, 1x, 3sp, 1x, 2sp, 1x, 3sp, 1x
11. 11sp, 1x,7sp, 1x, 14sp, 1x, 4sp, 1x, 3sp, 1x, 3sp, 1x, 1sp, 1x, 3sp, 2x, 2sp, 1x, 2sp, 1x, 2sp, 1x
12. 11sp, 1x, 7sp, 1x, 14sp, 1x, 4sp, 1x, 3sp, 1x, 2sp, 1x, 3sp, 1x, 2sp, 1x, 1sp, 1x, 1sp, 1x,2sp, 3x
13. 11sp, 1x, 6sp, 1x, 15sp, 1x, 4sp, 5x, 2sp, 5x, 2sp, 1x, 2sp, 2x, 2sp, 1x, 1sp, 1x
14. 8sp, 13x, 13sp, 1x, 4sp, 1x, 3sp, 1x, 2sp, 1x, 3sp, 1x, 2sp, 1x, 3sp, 1x, 2sp, 1x, 2sp, 1x
15. 8sp, 1x, 1sp, 1x, 1sp, 1x, 1sp, 1x, 1sp, 1x, 1sp, 1x, 1sp, 1x, 13sp, 1x, 4sp, 1x, 3sp, 1x, 2sp, 1x, 3sp, 1x, 2sp, 1x, 3sp, 1x, 2sp, 1x, 3sp, 1x
16. 7sp, 15x
17. 7sp, 2x,2sp, 1x, 4sp, 1x, 2sp, 1x, 1sp, 1x
18. 5sp, 2x, 2sp, 1x, 2sp, 1x, 2sp, 1x, 2sp, 1x, 3sp, 2x, 10sp, 1x, 3sp, 1x, 3sp, 3x, 3sp, 1x, 3sp, 1x, 2sp, 1x
19. 4sp, 2x, 2sp, 1x, 3sp, 1x, 2sp, 1x, 3sp, 1x, 2sp, 2x, 10sp, 1x, 3sp, 1x, 2sp, 1x, 3sp, 1x, 2sp, 1x, 3sp, 1x, 2sp, 1x
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21. 8sp, 3x, 6sp, 3x, 16sp, 1x, 4sp, 1x, 3sp, 1x, 2sp, 1x, 3sp, 1x, 2sp, 1x
22. 11sp, 6x, 19sp, 1x, 4sp, 1x, 3sp, 1x, 2sp, 1x, 3sp, 1x

23. 11sp, 1x, 3sp, 1x, 20sp, 1x, 5sp, 3x, 4sp, 3x, 3sp, 1x
24. 12sp, 1x, 1sp, 1x
25. 12sp, 1x, 1sp, 2x
26. 11sp, 2x, 1sp, 1x, 1sp, 1x
27. 11sp, 2x, 1sp, 1x, 2sp, 1x
28. 10sp, 1x, 1sp, 1x, 1sp, 1x, 3sp, 1x
29. 10sp, 3x, 1sp, 1x, 3sp, 1x
30. 10sp, 1x, 1sp, 3x, 3sp, 1x
31. 10sp, 2x, 2sp, 1x, 3sp, 1x
32. 10sp, 1x, 1sp, 1x, 2sp, 1x, 2sp, 1x
33. 10sp, 2x, 3sp, 1x, 2sp, 1x
34. 10sp, 2x, 3sp, 1x, 1sp, 1x
35. 11sp, 1x, 3sp, 1x, 1sp, 1x
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69. 12sp, 1x, 1sp, 2x, 3sp, 2x, 7sp, 1x, 2sp, 1x, 1sp, 1x, 2sp, 1x, 5sp, 1x, 4sp, 2x, 3sp, 1x
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77. 14sp, 1x, 1sp, 1x, 7sp, 1x, 5sp, 1x, 2sp, 1x, 2sp, 1x, 1sp, 1x, 9sp, 1x, 1sp, 2x, 3sp, 1x, 1sp, 1x
78. 15sp, 1x, 1sp, 1x, 5sp, 2x, 5sp, 1x, 2sp, 1x, 3sp, 1x, 1sp, 1x, 7sp, 1x, 2sp, 1x, 5sp, 2x
79. 16sp, 1x, 1sp, 5x, 1sp, 1x, 5sp, 1x, 3sp, 1x, 1sp, 2x, 2sp, 1x, 5sp, 2x, 1sp, 1x, 4sp, 4x
80. 16sp, 1x, 6sp, 1x, 4sp, 2x, 4sp, 1x, 1sp, 2x, 2sp, 1x, 3sp,

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2x, 1sp, 1x, 9sp, 2x

81. 16sp, 1x, 6sp, 1x, 2sp, 2x, 1sp, 1x, 4sp, 1x, 1sp, 1x, 1sp, 1x, 2sp, 3x, 3sp, 1x, 7sp, 2x, 2sp, 2x
82. 16sp, 1x, 5sp, 1x, 3sp, 1x, 2sp, 1x, 4sp, 1x, 1sp, 1x, 2sp, 1x, 2sp, 1x, 4sp, 1x, 13sp, 1x
83. 17sp, 1x, 4sp, 1x, 3sp, 1x, 1sp, 1x, 6sp, 1x, 1sp, 1x, 4sp, 1x, 4sp, 1x, 14sp, 1x
84. 18sp, 1x, 2sp, 1x, 3sp, 1x, 2sp, 1x, 6sp, 1x, 2sp, 1x, 2sp, 1x, 6sp, 1x, 5sp, 5x, 3sp, 1x
85. 19sp, 3x, 3sp, 1x, 2sp, 1x, 9sp, 1x, 2sp, 1x, 3sp, 1x, 3sp, 5x, 2sp, 1x, 1sp, 5x
86. 20sp, 1x, 4sp, 1x, 2sp, 1x, 11sp, 1x, 2sp, 2x, 1sp, 1x, 8sp, 1x, 4sp, 1x, 1sp, 1x,
87. 19sp, 1x, 4sp, 1x, 2sp, 2x, 10sp, 1x, 2sp, 1x, 2sp, 1x, 9sp, 1x, 4sp, 1x, 2sp, 1x
88. 18sp, 1x, 5sp, 1x, 1sp, 1x, 1sp, 1x, 10sp, 1x, 2sp, 1x, 1sp, 1x, 10sp, 1x, 5sp, 1x
89. 17sp, 1x, 6sp, 1x, 1sp, 1x, 1sp, 1x, 10sp, 1x, 3sp, 1x, 11sp, 1x, 6sp, 1x
90. 17sp, 1x, 5sp, 1x, 2sp, 1x, 1sp, 1x, 9sp, 1x, 4sp, 1x, 9sp, 1x, 1sp, 1x, 6sp, 1x
91. 17sp, 1x, 4sp, 2x, 1sp, 1x, 2sp, 1x, 9sp, 1x, 4sp, 1x, 3sp, 1x, 5sp, 1x, 1sp, 1x, 7sp, 1x
92. 17sp, 1x, 3sp, 1x, 1sp, 1x, 1sp, 1x, 3sp, 1x, 7sp, 1x, 4sp, 1x, 4sp, 1x, 5sp, 1x, 1sp, 1x, 7sp, 1x,
93. 17sp, 1x, 2sp, 1x, 1sp, 1x, 2sp, 1x, 3sp, 1x, 6sp, 1x, 4sp, 1x, 4sp, 1x, 6sp, 1x, 1sp, 1x, 7sp, 1x
94. 17sp, 1x, 1sp, 1x, 2sp, 1x, 2sp, 1x, 9sp, 1x, 5sp, 1x, 4sp, 1x, 6sp, 1x, 1sp, 1x, 7sp, 1x
95. 17sp, 1x, 1sp, 1x, 2sp, 1x, 2sp, 1x, 8sp, 1x, 5sp, 1x, 4sp, 1x, 3sp, 1x, 3sp, 1x, 2sp, 1x, 6sp, 1x, 3sp, 3x
96. 17sp, 1x, 1sp, 1x, 1sp, 1x, 4sp, 1x, 6sp, 1x, 6sp, 1x, 4sp, 1x, 3sp, 1x, 3sp, 1x, 2sp, 1x, 7sp, 1x, 1sp, 1x, 1sp, 1x, 1sp, 1x
97. 18sp, 1x, 1sp, 1x, 5sp, 1x, 4sp, 2x, 6sp, 1x, 4sp, 1x, 4sp, 1x, 3sp, 1x, 2sp, 1x, 7sp, 2x, 2sp, 1x, 1sp, 1x
98. 19sp, 1x, 6sp, 1x, 3sp, 1x, 7sp, 1x, 4sp, 1x, 5sp, 1x, 2sp, 1x, 3sp, 1x, 7sp, 1x, 3sp, 1x, 2sp, 1x
99. 19sp, 1x, 7sp, 1x, 1sp, 1x, 7sp, 1x, 4sp, 1x, 4sp, 1x, 1sp, 1x, 2sp, 1x, 4sp, 1x, 5sp, 1x, 5sp, 1x, 1sp, 1x
100. 19sp, 1x, 8sp, 1x, 6sp, 2x, 4sp, 1x, 5sp, 1x, 1sp, 1x, 2sp, 1x, 4sp, 1x, 4sp, 1x, 6sp, 1x, 1sp, 1x
101. 19sp, 1x, 6sp, 2x, 6sp, 1x, 6sp, 1x, 4sp, 1x, 1sp, 1x, 3sp, 1x, 3sp, 1x, 4sp, 1x, 7sp, 1x, 2sp, 1x
102. 18sp, 1x, 6sp, 1x, 6sp, 2x, 6sp, 1x, 5sp, 1x, 1sp, 1x, 3sp, 1x, 3sp, 1x, 3sp, 1x, 9sp, 1x, 1sp, 1x
103. 18sp, 1x, 4sp, 2x, 5sp, 2x, 7sp, 1x, 6sp, 1x, 1sp, 1x, 3sp, 1x, 3sp, 1x, 1sp, 2x, 10sp, 1x, 1sp, 1x
104. 18sp, 1x, 3sp, 1x, 5sp, 2x, 8sp, 1x, 7sp, 1x, 1sp, 1x, 2sp, 1x, 4sp, 2x, 12sp, 1x, 2sp, 1x
105. 19sp, 3x, 5sp, 1x, 8sp, 2x, 7sp, 1x, 2sp, 1x, 2sp, 1x, 4sp, 1x, 14sp, 1x, 1sp, 1x
106. 19sp, 1x, 5sp, 2x, 7sp, 2x, 9sp, 1x, 1sp, 1x, 3sp, 1x, 3sp, 1x, 15sp, 1x, 1sp, 1x
107. 18sp, 1x, 4sp, 2x, 6sp, 3x, 11sp, 1x, 1sp, 1x, 2sp, 1x, 5sp, 1x, 14sp, 1x, 2sp, 1x
108. 17sp, 1x, 4sp, 1x, 7sp, 1x, 13sp, 1x, 2sp, 1x, 2sp, 1x, 5sp, 1x, 15sp, 1x, 1sp, 1x
109. 16sp, 1x, 27sp, 1x, 1sp, 1x, 3sp, 1x, 5sp, 1x, 15sp, 1x, 1sp, 1x
110. 15sp, 60x

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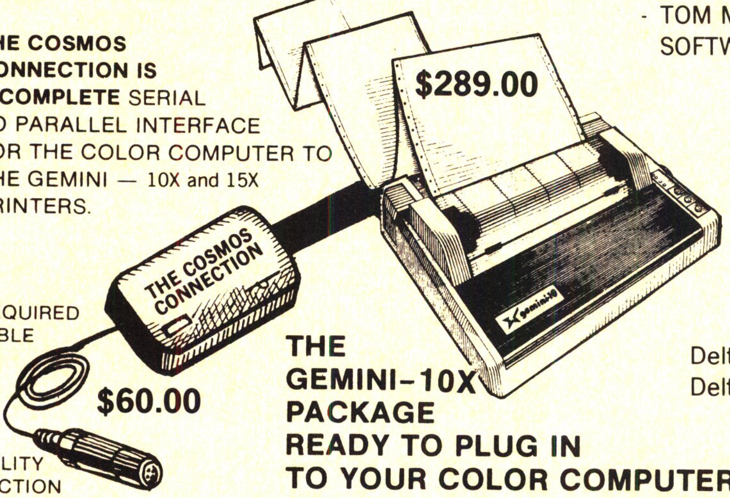

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This is the first installment of a six-part series on creating a disk mailing list program

Developing A Database Manager — Part 1

By Bill Nolan
RAINBOW Contributing Editor

This is the first column in a series of six that will show you how to develop a database manager (DBM) program. The articles will have an instructional format, and we will also be working on a mailing list program which will be presented in its complete form in the last column. A mailing list is just a special case of a DBM program, so when we are finished you will have a *very* complete mailing list and also you will have the knowlege to change the program into whatever kind of database you need.

Let's start by deciding what is needed in a DBM program. To use the example of the mailing list, you need to be able to store the names and addresses, print them out on labels, sort them into alphabetical (or other) order, search through the file looking for people fitting certain search criteria, and easily add to, delete from, or modify the list of names.

In this program we are going to be storing our names and addresses on the disk, using direct access disk files, so this program we will be writing will be usable only on disk systems. It will run on a machine with 16K of memory or more. In this first article we will concentrate on a function which few people use, and which we will need when we write our search section of the program, and then in the upcoming articles we will develop a new section each time.

First, then, we are going to examine the *INSTR* function, looking at both some possible uses and how the function is actually used. Before we start this, however, we need to discuss just what we are talking about when we say "function."

A function is like a little built-in program that is supplied when you buy the computer. Color Computer BASIC has a lot of functions included with it, and all of them work in essentially the same way. All functions do what is called "returning a value." This means that when you call up the function, it will do its job and then give the results of that job back to you. Because of this, you must decide ahead of time what you want to do with the results of a function. Usually you will either *PRINT* out the results right away, compare the results to something using an *IF . . . THEN* statement, or store the results in a variable. Functions can be recognized easily because they will start with "*PRINT* function", or "X=function", or "*IF* function = argument *THEN* . . .".

Functions are divided into two types, depending upon the characteristics of the value they return. If the result of the function is a "string" of alphanumeric characters, then it is a string function, but if the result is a number, then it is a numeric function. *INSTR* is a numeric function, although it is applied to strings, because the result returned is a number.

The "syntax" or correct form of the *INSTR* function is:

```
X = INSTR (start position, search string, target string)
```

The X at the beginning can be any valid numeric variable name. This is the variable we must provide so the computer will have a place to store the results of the function. The word *INSTR* is the name of the function, so that's how the computer will know what we are wanting it to do. The information contained inside the parentheses is called the argument of the function, and we will be looking at that in detail in a moment.

The purpose of the *INSTR* function is to look through a string and find out whether another string is contained inside. For instance, if we have a string "John Smithson," we may want to look through it to see if it contains the smaller string "Smith." Without the *INSTR* function this would be a tough job, but with this function it's a breeze. The syntax for this is:

```
X=INSTR(1,"John Smithson","Smith")
```

Again, the X is where the answer will be stored. The one is the start position. Since we have used a one, the computer knows we want it to start looking at the first character in the

---

(Bill Nolan, who teaches "Programming In BASIC" at the college level, owns Prickly-Pear Software Co. and has written several commercially successful software packages.)

search string, so it will start at the “J” in John and compare the target string (that's the string we are trying to match) with all of the possible little strings inside “John Smithson.” It always compares strings of equal length, so first it will compare “John ” to “Smith” and see if they are the same. Since they aren't, it will go on and compare “ohn S” to “Smith,” and then “hn Sm” to “Smith.” It will continue like this until it gets to the “Smith” in “Smithson,” and then it will be comparing one “Smith” to another “Smith,” which is a match.

If it finds a match, it will return the number of the first character in the match. In this case, the “S” in the beginning of the word “Smith” inside the string “John Smithson” is the sixth character. Count them . . . “J” is one, “o” is two, “h” is three, and so on. The result of this is that X will be equal to six. Try typing in this little program and running it.

```
30 X=INSTR(1,“John Smithson”,“Smith”)
40 PRINT X
```

In actual use, you won't actually use the real words inside the parentheses, you will use variable names instead, like this:

```
10 A$=“John Smithson”
20 B$=“Smith”
30 X=INSTR(1,A$,B$)
40 PRINT X
```

So, now that we know *how* to use the function, let's look at some practical uses for this very powerful function. The most common use is in database or mailing list programs, as part of a search section of the program. Try this short program.

```
10 CLS
20 PRINT
30 INPUT “ENTER THE STRING YOU WANT TO
SEARCH FOR”;T$
40 FOR X=1 TO 15
50 READ M$
60 IF INSTR(1,M$,T$) THEN PRINT M$
70 NEXT X
100 DATA JOHN SMITHSON,MIKE RODGERS,
BILL NOLAN,JANE SMITH,NOLAN RYAN
110 DATA MARY JANE DOE,DONALD JOHN,
RODGER JONES,PAUL FREDRICKS,JIM JONES
120 DATA FRED RODGERS,PAULETTE SMITH,
BETH JOHNSON,BILLY CARTER,DON DOE
```

When you *RUN* this you will get some interesting results. Try answering the question with JOHN, SMITH, RODGER, SON, BILL, or FRED. The program will search out all the names with those words anywhere in them and print them out. Try answering the question with a single letter!

Now let's go through the program one line at a time to see how it works. Line 10 clears the screen. Line 20 prints a blank line on the screen (I find the first line harder to read than the others). Line 30 asks you for a string to search for, and when you enter it, it stores it in the variable T$. A note is in order here. The computer thinks that capital letters and lowercase letters are unrelated. In other words, it doesn't think that “SMITH” and “smith” are the same thing at all, so since all of my *DATA* is in capital letters, the target strings you input must be in uppercase also, or no match will be found.

Line 40 sets up a loop to read and compare the data. Why 15? I have 15 pieces of data in Lines 100-120. Line 50 reads a name out of the data, and Line 60 is why we wrote this program. This line checks to see if a match is found. When you use the *IF* like this without a logical argument, the computer will check the function to see if it returned a zero or not. (*INSTR* returns a zero when no match is found.)

In this case then, since if a match is found, the computer will return a number indicating where it starts, the name will be printed if your target occurs anywhere inside it, while if no match is found, the computer will just go on to the next name. When it has checked all the names, the program will end. If you want to try a different target, just run it again.

Another common use for *INSTR* is with menus. A menu is just a list of choices, like this:

```
10 CLS
20 PRINT
30 PRINT “(A)DD A NAME”
40 PRINT “(D)ELETE A NAME”
50 PRINT “(S)EARCH FOR A NAME”
60 PRINT “(E)ND THE PROGRAM”
70 PRINT “PRESS THE LETTER OF YOUR CHOICE”
80 K$=INKEY$: IF K$=“” THEN 80
```

Now we've printed a menu on the screen and asked the user of the program to press ‘A’, ‘D’, ‘S’, or ‘E’. Line 80 will strobe the keyboard until they press a key. Without *INSTR* we would now need something like this:

```
90 IF K$=“A” THEN GOTO . . .
100 IF K$=“D” THEN GOTO . . .
110 IF K$=“S” THEN GOTO . . .
120 IF K$=“E” THEN GOTO . . .
130 GOTO 80
```

Line 130 is there in case you pushed the wrong key. This isn't too bad for a short menu, but if there are 12 choices then you will need 12 *IF . . . THEN* statements, and *IF . . . THENs* are slow. Try adding these lines instead.

```
90 M$=“ADSE”
100 X=INSTR(1,M$,K$)
110 ON X GOTO LINE,LINE,LINE,LINE
120 GOTO 80
```

Not only is this already shorter and faster, but if you expand the menu to 12 items, all you have to do is make *M$* longer and add some more line numbers to line 110. You won't need any more lines at all (except to print the menu on the screen).

In our final mailing list program, we will be using the *INSTR* function both for searches and menus. Next month we will look into the characteristics of direct access disk files, and we will write a program that will let you type in names and addresses and store them on the disk in a direct access file. Then, each month, we will write another section of the program, with full explanation of how it works. Before we know it, we will find that we have written the whole program one section at a time, in what is called a “modular” fashion, and all we will have to do is put the pieces together. See you next month.

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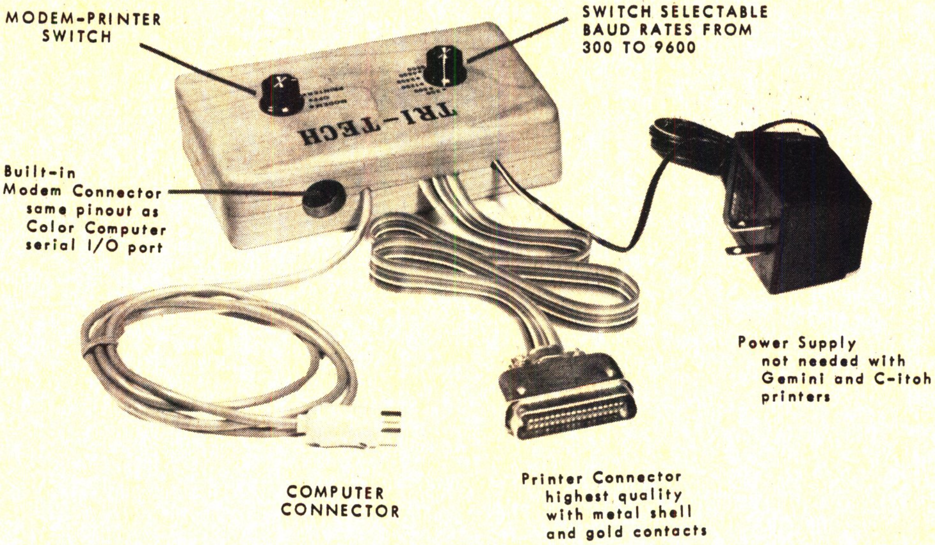
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REVERSE ƎƧЯƎVƎЯ

By Donald R. Clerc

I first saw this game in a very old issue of *Personal Computing* in the days when there were rumors about "microcomputers," and all games were played on huge mainframes. In the original game of *Reverse*, the player would arrange a list of numbers in ascending order from left to right. Since the CoCo has such excellent graphics, I modified the game so you reverse different lengths of colored bars to an ascending order from top (smallest) to bottom (largest). To move, you tell the computer how many bars (counting from the top) you want to reverse. Here is an example that may help my explanation. The numbers represent colored bars and are arranged from left to right.

2 3 4 5 6 1 7 8 9 0

If you reverse five numbers, the result will be:

6 5 4 3 2 1 7 8 9 0
(first 5 numbers reversed) (remainder stays the same)

Now, if you reverse six numbers, you win!

1 2 3 4 5 6 7 8 9 0
(first 6 numbers reversed)

(Donald Clerc is a Radio Shack Computer Center instructor. He and his wife are expecting their first child in August and he anticipates enrolling their child in his computer camps this Christmas.)

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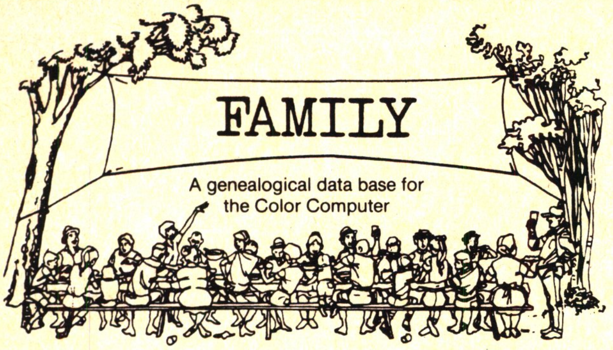
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Playing strategies

There are two main strategies in playing the game, using either an algorithmic or a heuristic approach. An algorithmic approach uses a specific pattern and guarantees a solution in a predictable number of moves. For example, an algorithmic approach to playing this version of *Reverse* would be to move the longest colored bar to the top, then move it down to the bottom. Then move the next longest bar to the top, and move it down to just above the bottom. This method guarantees a solution in 2N-3 moves, where N is the number of bars in the list. In this game using 10 colored bars, it would take you no more than 17 moves to win. A computer can easily play this type of strategy.

On the other hand, a heuristic approach to solving problems can be thought of as a rule of thumb. Some rules of thumb are very good and lead to good solutions, while others are not so good. Consequently, using a heuristic approach does not guarantee the best possible solution, but for very complex problems (and even some simple ones) it may be more efficient than the algorithmic approach.

Reverse lends itself very well to this heuristic approach. There are many possible solutions to each game. One is best, but the mathematics to determine that solution are quite complex. The simpler algorithmic approach does guarantee a solution, but it is far from efficient (and it gets boring after a while). A good heuristic approach, which takes advantage of "partial orderings" in the list, generally yields a solution within 10 to 20 percent (one or two moves) of perfection.

When using a heuristic approach, your next move is dependent upon the way the list currently appears. No solution is guaranteed in a predictable number of moves, but if you are clever (and sometimes lucky!) you should come out ahead of the simpler algorithmic approach. A good heuristic approach should solve this game in 10 moves or less.

Good luck!

Variables Used in the Program

A	Array to hold current sequence of numbers
B$	*INKEY$* to record your response
C	Color of bars
D	Used in *FOR ... NEXT* loop to randomize numbers
E	Random number used to randomize list
J	Used in array A to check for repeated numbers
K	Used in array A to generate and keep track of number list
M$	Message at end of game; based on total score
R$	String input from *INKEY$* for move
R	Numeric value for move; derived from R$
S	Used to produce ascending sounds
T	Current number of turns (moves)
W	Numbers (1-0) printed on screen
X	X-coordinate to print bars on screen
Y	Used for Y-coordinate to *SET* colored bars
Z	Used in array A to reverse positions of numbers

Program Line Description

10-160	Initialization and instructions
170-210	Randomizing numbers
220-260	Input move and reverse bars
270-290	Check to see if in numerical order
300-370	Display score and ask to play again
380-410	Subroutine for printing bars on screen

130	255
250	53
END	144

The listing:

```
10 REM ADAPTED BY DONALD CLERC
      LOUISVILLE, KY
20 CLS: PRINT: PRINT "   reverse
 -- A GAME OF SKILL": PRINT
30 POKE 65495,0: FOR S=1 TO 30:
SOUND S*5+100,1: NEXT
40 PRINT "DO YOU WANT THE RULES
(Y/N)? ";
50 B$=INKEY$: IF B$="" THEN 50 E
LSE IF B$="N" THEN PRINT B$: GOT
O 170
60 CLS:SOUND 100,2: PRINT: PRINT
 "THIS IS THE GAME OF 'REVERSE'.
  TO WIN, ALL YOU HAVE TO DO IS"
70 PRINT "ARRANGE A RANDOM LIST
OF TEN    COLORED BARS (NUMBERED
 FROM 1   THROUGH 0) IN ASCENDIN
G ORDER   FROM TOP (SMALLEST) TO
 BOTTOM   (LARGEST)."
80 PRINT: PRINT "TO MOVE, YOU TE
LL ME HOW MANY   BARS (COUNTING
FROM THE TOP)    YOU WANT ME TO
REVERSE."
90 PRINT @ 483, "PRESS ANY KEY T
O CONTINUE";
100 B$=INKEY$: IF B$="" THEN 100
110 CLS: SOUND 100,2: PRINT "FOR
 EXAMPLE, IF A LIST OF        NUM
BERS IS:                        2
  3  4  5  6  1  7  8  9  0"
120 PRINT "AND YOU REVERSE FIVE
NUMBERS,   THE RESULT WILL BE:
              6  5  4  3  2  1  7
  8  9  0"
130 PRINT "NOW, IF YOU REVERSE 6
, YOU WIN!   1  2  3  4  5  6  7
  8  9  0"
140 PRINT: PRINT "NO DOUBT YOU W
ILL LIKE THIS GAMEOF SKILL, BUT
IF YOU WANT TO    STOP, PRESS <Q
> TO QUIT."
150 PRINT @ 483, "PRESS ANY KEY
TO CONTINUE";
160 B$=INKEY$: IF B$="" THEN 160
170 SOUND 150,2: PRINT @ 480, "
THANK YOU...ONE MOMENT PLEASE ";
```

Learning*Leisure:

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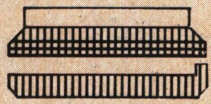
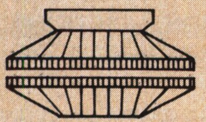
for Students and Teachers
by David Stanley

Now be able to create a test for any purpose. You choose the subject area and control the format. The many options of this program make studying interesting rather than tedious. You may have a question presented and you must type in the answer. You may have the answer flash on the screen, and you must type in the question. You may have a mixture of the above two formats. You may choose the flashcard feature that allows you to study before taking the test. You may add or change questions and answers. You may use short answer, fill-in, true/false, or multiple choice test. You may change the time limit for questions. Many more features, too. The printing command allows you to obtain hard copy of the entire test, or questions only, with space allowed for manual fill-in of the answer. This feature permits teachers to create exams or homework assignments. All tests may be saved and reloaded for future use. A program that does it all! Available in 32K E.B. $27.95 disk or $24.95 cassette.





NEW

The Factory: FROM SUNBURST
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KING AUTHOR'S TALES
by Steve Blyn

The creative writing tool you've been waiting for! This innovative program allows children in grades 2 to 6 to write compositions, book reports, or short stories and save them to files. The material can be reviewed, corrected, rewritten, saved, and reloaded at any time. It can then be changed over and over again, if desired. Included, as well, is a question and answer optional feature. The user may write a question and answer for each page of text. When the story is run, the question will appear after each page. The user types in the answer and the program responds, "Correct" or "Incorrect". Teachers may use this feature to create reading comprehension material for their classes. The child also has the option of creating a title page picture on the screen for each story. The drawing section has automatic key repeat for line drawing and allows for change of line colors. Pictures may also be saved. We have included a selection of stories and pictures with each program. King Author's Tales is available in 32K E.B. disk or 16 K E.B. cassette at $29.95 for either version. Printer is optional, but recommended.
Now available — Talking King Author, a version made especially to work with Spectrum's and Speech Systems Voice Pak. You'll hear your story, too! Same great features at the same price.

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TALKING FOREIGN LANGUAGES
TALKING POETRY CREATOR
TALKING SHORT STORY MAKER
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MATH TUTOR SERIES DIAGNOSTIC DISKS
NEW
By Ed Guy

These disks contain program series to give students practice in various mathematical operations and to give the teacher feedback on their progress. The feedback will give a "number right" report and also a diagnostic listing of where the student made an error, and how many times he used the "HELP" command featured in each program. Each student may do up to 10 examples, with at least 30 class sesesions per disk. A password system prevents students from seeing the reports of others in the class. Results may be printed out on screen or line printer. The Arithmetic Diagnostic Disk provides practice in division, multiplication, factor operations and algebraic evaluation (primarily intended to teach the hierarchy of operations). The Fractions Diagnostic Disk provides practice in addition, subtraction, multiplication, and division of fractions. All problems lead students step by step through examples and contain many "HELP" commands. ARITHMETIC DIAGNOSTIC DISK — 32K E.B. — $49.95. FRACTIONS DIAGNOSTIC DISK — 32K E.B. - $49.95 DISK ONLY.

HAPPY BIRTHDAY RAINBOW

NEW

The Pond: FROM SUNBURST
Strategies in Problem Solving

Grades 2-adult. Winner 1983 Learning Software Award. Recommended in Classroom Computer Learing. A small green frog, lost in a pond of lily pads, helps students recognize and articulate patterns, generalize from raw data and think logically. In the practice option, students choose from six levels of-difficulty, in which lily pads are displayed in increasingly complex patterns. The student must determine a pattern that will get the frog across the pond. In the game, students collect points by directing their frogs through as many ponds as possible in the fewest number of moves. Diskette for 32K TRS-80 Color Computer with Extended Color BASIC. $39.95

The best in software for kids!

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BY STEVE BLYN

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Learn to buy and add up your purchases from a typical fast-food restaurant menu.

MONEY-PAK 32K ECB $22.95
A combined and menu driven version of the above programs. Includes play money. Reviewed - Rainbow 7/83

CROCODILE MATH 16K ECB E.B. $17.95
An animated math game using hi-res graphics. A fish containing a problem moves toward a crocodile containing a possible answer. If the answer is true, open the crocodile's mouth with the joystick to eat the fish. If false, keep his mouth closed. Addition, subtraction, and multiplication examples on 3 levels, 3 speeds. Tape only. By Art Provost

NEW

COLORGRADE 32K ECB $29.95
A great aid to teachers. Records and calculates grades for up to 6 classes of up to 40 students each. Uses number or letter grades, named or numerical periods and gives a weighted average. Easy to use. Full directions. DISK ONLY. By David Lengyel.

HAPPY BIRTHDAY RAINBOW

BEYOND WORDS 32K ECB $19.95 Each
These Language Arts programs cover common misspellings, and synonyms/-antonyms on each level. Additionally, Level 1 tests contractions and abbreviations, Level 2 tests homonyms, and Level 3 tests analogies. Each program has 3 parts and contains over 400 questions and uses over 800 words. All tests are grade appropriate. User modifiable (directions included). Printer option.

Level 1 Grades 3-5
Level 2 Grades 6-8
Level 3 Grades 9-12
DISK VERSION Each $23.95

THE MATH TUTOR SERIES 16K Ext.
These tutorials take the child through each step of the example. All programs include HELP tables, cursor and graphic aids. All allow user to create the example, or let the computer choose. Multi-level. Great teaching programs. By Ed Guy.

LONG DIVISION TUTOR	$14.95
MULTIPLICATION TUTOR	$14.95
FACTORS TUTOR	$19.95
FRACTIONS TUTOR (Addition)	$19.95
FRACTIONS TUTOR (Subtraction)	$19.95
FRACTIONS TUTOR (Multiplication)	$19.95
Any 2 FRACTIONS programs	$29.95

EQUATIONS TUTOR32K EB$19.95

ARROW GAMES by Penny Bryan
32K EB. tape $21.95 disk $24.95
Six menu driven games for young children (ages 3-6) to teach directions. All games involve using the arrow keys. Games include LADYBUG, BUTTERFLY, ARROW MATCH, KALEIDOSCOPE, RABBIT, and DOODLE. Colorful graphics.

NEW

FIRST GAMES by Penny Bryan
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First Games contains 6 menu-driven programs to delight and teach your early learners (ages 3-6). These games enrich the learning of colors, numbers, lowercase letters, shapes, memory, visual discrimination and counting.

MATH INVADERS by David Steele
16K EB. $17.95
A multi-level 'Space Invaders' type game to reinforce the 4 basic math operations (addition, subtraction, multiplication and division). Problems become more difficult as you progress. Hi-res. graphics, joystick required.
TAPE ONLY

MORE LEARNINGWARE
(ALL PROGRAMS IN 16-K EXTENDED EXCEPT WHERE NOTED)

CONTEXT CLUES - by Steve Blyn - Multiple choice reading programs. Specify grade 4,5,6 or 7. each $17.95

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HAMSTER HUNT - by L&D Weston 32K - Beautiful graphics in this charming new kids adventure game. $19.95

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b & b software

```
180 REM RANDOMIZING LIST
190 FOR D=1 TO RND(TIMER/100): E
=RND(10): NEXT D: FOR K=1 TO 10
200 A(K)=RND(10): IF K=1 THEN NE
XT ELSE FOR J=1 TO K-1: IF A(K)=
A(J) THEN 200 ELSE NEXT J,K
210 T=0: GOSUB 390: REM GOTO PRI
NTING ROUTINE
220 PRINT @ 0, " HOW MANY SHALL
I REVERSE? ";
230 R$=INKEY$: IF R$="" THEN 230
 ELSE R=VAL(R$):IF R=0 THEN R=10
240 IF R$="Q" THEN 370 ELSE IF R
$<"0" OR R$>"9" THEN SOUND 1,10:
 PRINT @ 448, "PLEASE INPUT ONLY
 A NUMBER FROM 0 TO 9.";: GOTO 2
20 ELSE T=T+1
250 REM REVERSING BARS
260 FOR K=1 TO INT(R/2): Z=A(K):
 A(K)=A(R-K+1): A(R-K+1)=Z: NEXT
 K: GOSUB 390: REM GOTO PRINTING
 ROUTINE
270 REM CHECK TO SEE IF IN
        NUMERICAL ORDER
280 FOR K=1 TO 10: IF A(K)<>K TH
EN 220 ELSE NEXT K
290 PRINT @ 0, " YOU WON IN ONLY
"T"MOVES. ";
300 REM DETERMINE RESPONSE BASED
        ON NUMBER OF MOVES
310 IF M$(1)="" THEN FOR M=1 TO
6: READ M$(M): NEXT
320 DATA " WOW!! THAT'S FANTASTI
C!! "," EXCELLENT SCORE!! "," VE
RY GOOD SCORE! "," THAT'S NOT A
BAD SCORE. "," THAT'S OK, BUT YO
U CAN IMPROVE."," TRY TO DO BETT
ER NEXT TIME. "
330 IF T<8 THEN M=1 ELSE IF T>15
 THEN M=6 ELSE M=INT(T/2-2)
340 PRINT @ 32, M$(M);: FOR S=10
0 TO 235 STEP 5: SOUND S,1: NEXT
350 PRINT @ 448, " TRY AGAIN (Y/
N)? ";
360 B$=INKEY$: IF B$="" THEN 360
 ELSE IF B$="Y" THEN PRINT B$" "
;: GOTO 170
370 PRINT @ 416, "THANK YOU.  I
HOPE YOU HAD FUN!!";: POKE 65494
,0: END
380 REM SUBROUTINE FOR PRINTING
        BARS ON SCREEN
390 CLS(0): FOR Y=1 TO 10: IF Y=
10 THEN W=0 ELSE W=Y
400 PRINT @ (Y+2)*32, W;: IF A(Y
)>8 THEN C=A(Y)-8 ELSE C=A(Y)
410 SOUND 200-10*A(Y),1: FOR X=1
0 TO 10+5*A(Y): SET(X,Y*2+4,C):
NEXT X,Y: RETURN
```

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NOT FOR CoCo 2

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THE GUNFIGHTER

BY Terry A. Steen

An excellent hi-res, arcade quality game program for two players. Joysticks and 32K are required in this all machine language program.

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(by Bill Cook)

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see us at RAINBOWfest CHICAGO

A Fourth of July Celebration

By Peter Stumpf

Here is a program to help you celebrate the Fourth of July. It is called *American Patrol*, featuring music and graphics appropriate for a Fourth of July celebration. This program plays "The American Patrol," "America The Beautiful," "America," and "The Star Spangled Banner." Accompanying each are colorful Hi-Res graphics. (See Figures 1 and 2.)

Patrol requires 32K and Extended BASIC.

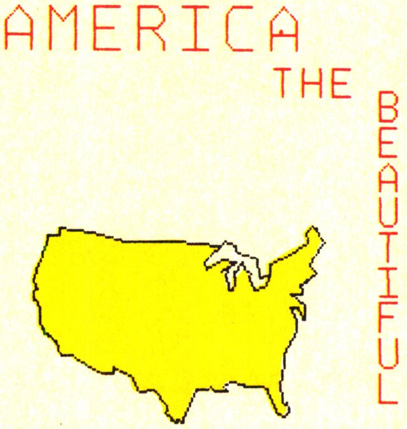


Figure 1b

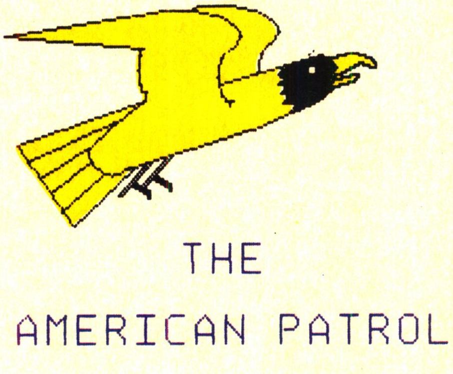
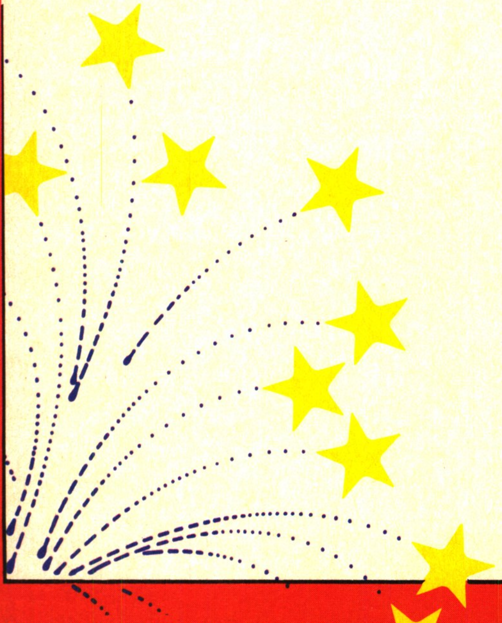
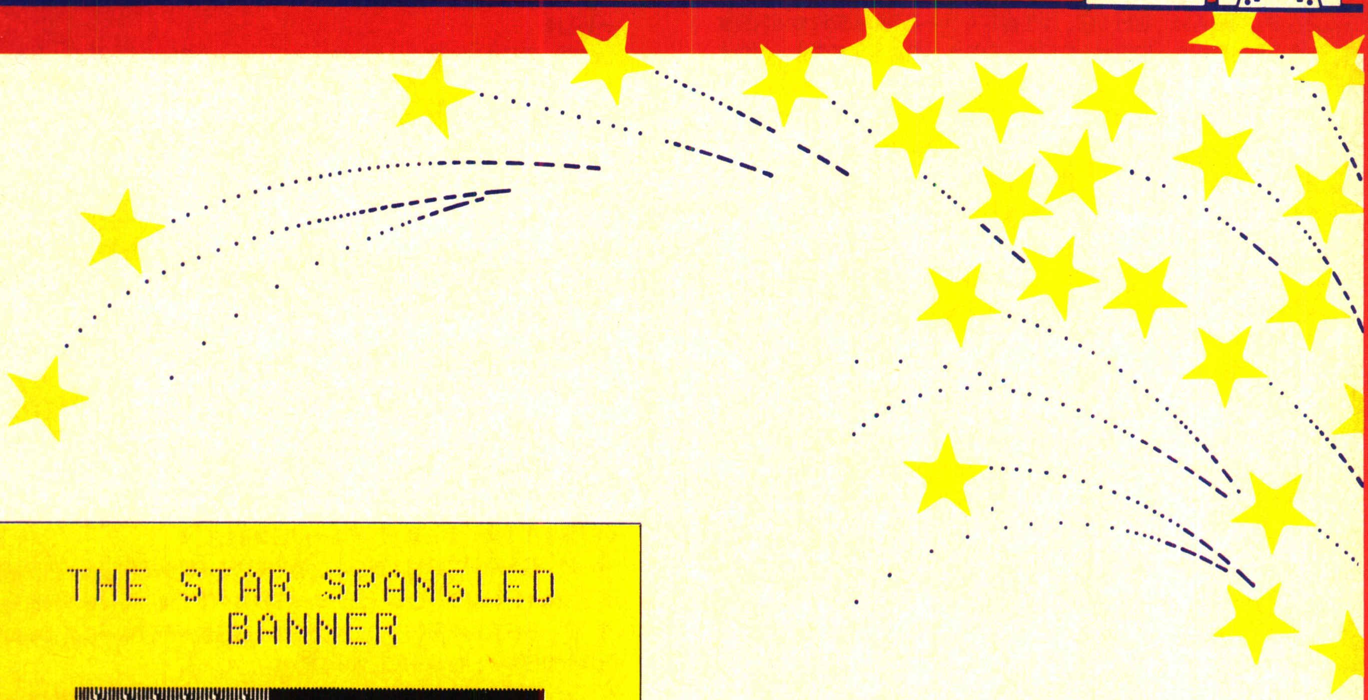
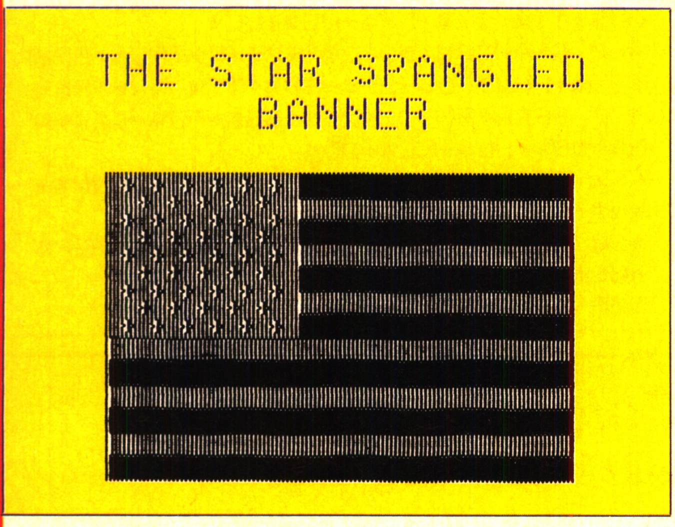


Figure 1a



Peter Stumpf, a high school freshman, has owned a CoCo for two and a half years and has written numerous programs for various computer publications. He is a self-taught programmer and especially enjoys writing graphics program.





THE STAR SPANGLED
BANNER

Figure 2

350	22	2140	17
1020	135	2310	197
1170	142	2510	153
1310	45	2680	81
1610	137	2970	152
1810	61	3240	42
1980	160	END	92

The listing:

```
10 '******************************
20 '*** THE  AMERICAN PATROL ***
30 '***    AND OTHER SONGS     ***
40 '***   ARRANGED FOR THE     ***
50 '***   COLOR COMPUTER BY    ***
60 '***      PETER STUMPF      ***
70 '*** 1508 APPALOOSA TRAIL ***
80 '***  MC HENRY, IL  60050 ***
90 '******************************
100 'THIS PROGRAM USES letters
     AS A SUBROUTINE.  letters
     IS A PROGRAM WRITTEN BY ME
     AND PUBLISHED IN color
     micro journal.
110 'THESE 2 LINES MUST BE LEFT
     IN THIS PROGRAM TO AVOID
     INFRINGING ON COPYRIGHT
     LAWS.
120 CLEAR 5000
130 DIM N$(15)
140 GOSUB 2890
150 '****************************
     ***      TITLE PAGE      ***
     ****************************
160 CLS
170 PCLS:PMODE4,1:SCREEN1,1
180 DRAW"BM100,25S8"+TT$+HH$+EE$
190 DRAW"BM101,26"+TT$+HH$+EE$
200 DRAW"BM102,27"+TT$+HH$+EE$
210 DRAW"BM18,50S8"+AA$+MM$+EE$+
RR$+II$+CC$+AA$+NN$+SP$+PP$+AA$+
TT$+RR$+OO$+LL$
220 DRAW"BM19,51"+AA$+MM$+EE$+RR
$+II$+CC$+AA$+NN$+SP$+PP$+AA$+TT
$+RR$+OO$+LL$
230 DRAW"BM20,52"+AA$+MM$+EE$+RR
$+II$+CC$+AA$+NN$+SP$+PP$+AA$+TT
$+RR$+OO$+LL$
240 DRAW"BM87,70S4"+AA$+NN$+DD$+
SP$+OO$+TT$+HH$+EE$+RR$
```

```
250 DRAW"BM100,89"+SS$+OO$+NN$+G
G$+SS$
260 DRAW"BM18,110S4"+AA$+RR$+RR$
+AA$+NN$+GG$+EE$+DD$+SP$+FF$+OO$
+RR$+SP$
270 DRAW"BM110,110S4"+TT$+HH$+EE
$+SP$+CC$+OO$+LL$+OO$+RR$
280 DRAW"BM178,110S4"+CC$+OO$+MM
$+PP$+UU$+TT$+EE$+RR$
290 DRAW"BM110,128S4"+BB$+YY$
300 DRAW"BM35,150S8"+PP$+EE$+TT$
+EE$+RR$+SP$+SS$+TT$+UU$+MM$+PP$
+FF$
310 DRAW"BM36,151"+PP$+EE$+TT$+E
E$+RR$+SP$+SS$+TT$+UU$+MM$+PP$+F
F$
320 DRAW"BM37,152"+PP$+EE$+TT$+E
E$+RR$+SP$+SS$+TT$+UU$+MM$+PP$+F
F$+"S4"
330 DRAW"BM44,179"+HH$+II$+TT$+S
P$+AA$+NN$+YY$+SP$+KK$+EE$+YY$+S
P$+TT$+OO$
340 DRAW"BM144,179"+CC$+OO$+NN$+
TT$+II$+NN$+UU$+EE$
350 IFINKEY$=""THEN350
360 '****************************
    ***       SONG MENU       ***
    ****************************
370 PCLS:PMODE4:SCREEN1,1
380 DRAW"BM78,30S12"+MM$+EE$+NN$
+UU$
390 DRAW"BM79,31"+MM$+EE$+NN$+UU
$
400 DRAW"BM80,32"+MM$+EE$+NN$+UU
$
410 DRAW"BM10,60S4"+N$(1)+PE$+SP
$+TT$+HH$+EE$+SP$+AA$+MM$+EE$+RR
$+II$+CC$+AA$+NN$
420 DRAW"BM124,60"+PP$+AA$+TT$+R
R$+OO$+LL$
430 DRAW"BM10,80"+N$(2)+PE$+SP$+
AA$+MM$+EE$+RR$+II$+CC$+AA$
440 DRAW"BM10,100"+N$(3)+PE$+SP$
+AA$+MM$+EE$+RR$+II$+CC$+AA$+SP$
+TT$+HH$+EE$
450 DRAW"BM114,100"+BB$+EE$+AA$+
UU$+TT$+II$+FF$+UU$+LL$
460 DRAW"BM10,120"+N$(4)+PE$+SP$
+TT$+HH$+EE$+SP$+SS$+TT$+AA$+RR$
470 DRAW"BM92,120"+SS$+PP$+AA$+N
N$+GG$+LL$+EE$+DD$
480 DRAW"BM154,120"+BB$+AA$+NN$+
NN$+EE$+RR$
490 DRAW"BM10,140"+N$(5)+PE$+SP$
+EE$+NN$+DD$
500 Z$=INKEY$
```

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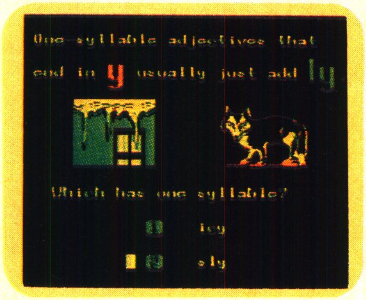

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```
510 Z=VAL(Z$)
520 IFZ=1THENGOSUB590:GOTO370
530 IFZ=2THENGOSUB1100:GOTO370
540 IFZ=3THENGOSUB1320:GOTO370
550 IFZ=4THENGOSUB2520:GOTO370
560 IFZ=5THENCLS:END
570 GOTO 500
580 '***************************
     *** THE AMERICAN PATROL ***
     ***************************
590 PCLS:PMODE4:SCREEN1,1
600 LINE(20,40)-(90,30),PSET
610 LINE(20,40)-(86,45),PSET
620 CIRCLE(86,54),4,1,3,.20,.73
630 CIRCLE(102,40),30,,.4,.7,.1
640 CIRCLE(126,57),6,,2,.2,.7
650 CIRCLE(120,38),30,,.4,.7,.1
660 CIRCLE(145,55),6,,2,.5,.7
670 LINE(122,60)-(170,48),PSET
680 CIRCLE(169,53),8,,.6,.7,.2
690 CIRCLE(165,54),3
700 DRAW"BM173,49R4UR4UR6DR3DR3D
RDRD2L3UL3UL2DL2DL2DL2DL2DL3DL3D
2R2UR4UR4UR4DLDLDL3DL4DL4UD
710 LINE(178,60)-(168,67),PSET
720 LINE-(140,78),PSET
730 LINE(153,73)-(158,68),PSET
740 LINE-(151,68),PSET
750 LINE-(155,65),PSET
760 LINE-(150,64),PSET
770 LINE-(154,61),PSET
780 LINE-(149,60),PSET
790 LINE-(153,58),PSET
800 LINE-(149,56),PSET
810 LINE-(153,53),PSET
820 PAINT(160,60),1,1
830 LINE(140,78)-(77,96),PSET
840 LINE(86,67)-(70,78),PSET
850 LINE(70,78)-(59,88),PSET
860 CIRCLE(70,88),12,,.99,1.13,.
5
870 LINE(86,67)-(25,86),PSET
880 LINE(25,86)-(52,120),PSET
890 LINE(52,120)-(80,96),PSET
900 LINE(30,93)-(72,76),PSET
910 LINE(36,100)-(61,86),PSET
920 LINE(41,106)-(60,93),PSET
930 LINE(46,114)-(65,99 ),PSET
940 DRAW"BM100,89;G14E4R2DR2DR2D
R2DD2L1U2L2UL2UL2UL2G4L2E14
950 DRAW"BM90,92;G14E4R2DR2DR2DR
2DD2L1U2L2UL2UL2UL2G4L2E14
960 DRAW"BM98,140S8"+TT$+HH$+EE$
970 DRAW"BM20,170"+AA$+MM$+EE$+R
R$+II$+CC$+AA$+NN$+SP$+PP$+AA$+T
T$+RR$+OO$+LL$
980 V$(1)="L4T3O3CFFL8FEFGL4AAL8
AG#AB-O4L4CCL8CO3BO4CFL2.C"
990 V$(2)="T3O3L4AB-L8B-AL4GB-AL
8AGL4FAGDEFL2.G
1000 V$(3)="L4O3FO4DCO3B-AGFEFGL
8AB-L4AGL2.FP6"
1010 PLAY V$(1)+V$(2)+V$(1)+V$(3
)
1020 V$(4)="T3L4O3CL4B-B-B-B-L8B
-O3AL2B-L4BO4CP255CL8CO3B-AB-O4L
2.CP6"
1030 V$(5)="O4L4C#DDFDCCL8CO3B-A
B-B-;EB-AAL8AGL4F;O4DDFDCCL8CO3B
-L4AB-B-EGL2FP6"
1040 V$(6)="O3L8AP255AL4P255AP25
5AP255A;O4L8P255CP255CL4P255CP25
5CL2P255C;O4L8P255EP255EL4P255EP
255EP255E;L8GP255GL4P255GP255GL2
.CP6"
1050 PLAY V$(4)+V$(4)+V$(5)
1060 PLAY V$(6)
1070 FORP=1TO500:NEXT
1080 RETURN
1090 '**************************
*     ***       AMERICA       **
*     **************************
*
1100 PCLS
1110 DRAW"BM45,40S12"+AA$+MM$+EE
$+RR$+II$+CC$+AA$
1120 DRAW"BM1,80S4"+MM$+YY$+SP$+
CC$+OO$+UU$+NN$+TT$+RR$+YY$+SP$+
AP$+TT$+II$+SS$
1130 DRAW"BM109,80"+OO$+FF$+SP$+
TT$+HH$+EE$+EE$+CO$+SP$+SS$+WW$+
EE$+EE$+TT$
1140 DRAW"BM206,81"+LL$+AA$+NN$+
DD$+SP$+OO$+FF$
1150 DRAW"BM1,100"+LL$+II$+BB$+E
E$+RR$+TT$+YY$+CO$+SP$+"BU1"+OO$
+FF$+SP$
1160 DRAW"BM80,100"+TT$+HH$+EE$+
EE$+SP$+II$+SP$+SS$+II$+NN$+GG$+
SE$
1170 DRAW"BM165,100"+LL$+AA$+NN$
+DD$+SP$+WW$+HH$+EE$+RR$+EE$+SP$
+MM$+YY$
1180 DRAW"BM1,120"+FF$+AA$+TT$+H
H$+EE$+RR$+SS$+SP$+DD$+II$+EE$+D
D$+EX$
1190 DRAW"BM94,120"+LL$+AA$+NN$+
DD$+SP$+OO$+FF$+SP$+TT$+HH$+EE$
1200 DRAW"BM172,120"+PP$+II$+LL$
+GG$+RR$+II$+MM$+SS$+AP$
1210 DRAW"BM1,140"+PP$+RR$+II$+D
D$+EE$+EX$+SP$+FF$+RR$+OO$+MM$
1220 DRAW"BM80,140"+EE$+VV$+EE$+
RR$+YY$+SP$+MM$+OO$+UU$+NN$+TT$+
AA$+II$+NN$
1230 DRAW"BM176,140"+SS$+II$+DD$
+EE$+CO$+SP$+"BU1"+LL$+EE$+TT$
1240 DRAW"BM1,160"+FF$+RR$+EE$+E
```

```
E$+DD$+OO$+MM$+SP$+RR$+II$+NN$+G
G$+EX$
1250 PLAY"T2O3L4GP255GAL4.F#L6GL
4ABP255BO4CO3L4.BL6AL4GAGF#L2.GP
6"
1260 PLAY"O4L4DP255DP255DL4.DL6C
O3L4B"
1270 PLAY"O4L4CP255CP255CP255L4.
CL6O3BL4A"
1280 PLAY"O3L4BL8O4CO3BAGL4.BL5O
4CDP255L8ECL4O3BAL4.G"
1290 FORP=1TO1000:NEXT
1300 RETURN
1310 '***************************
     ***AMERICA THE BEAUTIFUL***
     ***************************
1320 PCLS
1330 DRAW"BM10,30S12"+AA$+MM$+EE
$+RR$+II$+CC$+AA$
1340 DRAW"BM140,50S8"+TT$+HH$+EE
$
1350 DRAW"BM190,60"+BB$
1360 DRAW"BM190,75"+EE$
1370 DRAW"BM190,90"+AA$
1380 DRAW"BM190,105"+UU$
1390 DRAW"BM190,120"+TT$
1400 DRAW"BM190,135"+II$
1410 DRAW"BM190,150"+FF$
1420 DRAW"BM190,165"+UU$
1430 DRAW"BM190,180"+LL$
1440 LINE(40,110)-(40,112),PSET
1450 LINE(40,112)-(33,129),PSET
1460 LINE(33,129)-(35,132),PSET
1470 LINE(35,132)-(33,133),PSET
1480 LINE(33,133)-(33,137),PSET
1490 LINE(34,137)-(36,140),PSET
1500 LINE(36,140)-(36,145),PSET
1510 LINE(36,146)-(37,149),PSET
1520 LINE(38,149)-(38,151),PSET
1530 LINE(38,151)-(41,152),PSET
1540 LINE(40,151)-(42,153),PSET
1550 LINE(43,154)-(44,154),PSET
1560 LINE(44,154)-(46,160),PSET
1570 LINE(46,160)-(52,160),PSET
1580 LINE(53,161)-(65,168),PSET
1590 LINE(66,168)-(71,168),PSET
1600 LINE(71,168)-(71,166),PSET
1610 LINE(71,165)-(79,169),PSET
1620 LINE(79,169)-(83,176),PSET
1630 LINE(83,176)-(90,175),PSET
1640 LINE(90,175)-(96,182),PSET
1650 LINE(96,182)-(96,184),PSET
1660 LINE(95,185)-(98,187),PSET
1670 LINE(98,188)-(101,189),PSET
1680 LINE(101,188)-(104,189),PSE
T
1690 LINE(104,188)-(110,175),PSE
T
1700 LINE(110,175)-(116,175),PSE
```

```
T
1710 LINE(116,175)-(117,174),PSE
T
1720 LINE(117,174)-(119,176),PSE
T
1730 LINE(119,176)-(125,176),PSE
T
1740 LINE(125,176)-(123,174),PSE
T
1750 LINE(123,174)-(126,172),PSE
T
1760 LINE(126,172)-(133,173),PSE
T
1770 LINE(133,174)-(134,174),PSE
T
1780 LINE(135,174)-(141,174),PSE
T
1790 LINE(141,174)-(144,175),PSE
T
1800 LINE(144,175)-(144,177),PSE
T
1810 LINE(144,177)-(149,186),PSE
T
1820 LINE(149,186)-(152,187),PSE
T
1830 LINE(152,187)-(154,185),PSE
T
1840 LINE(154,185)-(153,181),PSE
T
1850 LINE(151,181)-(151,179),PSE
T
1860 LINE(151,179)-(150,174),PSE
T
1870 LINE(150,174)-(152,164),PSE
T
1880 LINE(152,164)-(152,160),PSE
T
1890 LINE(152,160)-(158,151),PSE
T
1900 LINE(158,151)-(158,147),PSE
T
1910 LINE(158,147)-(155,141),PSE
T
1920 LINE(156,141)-(158,141),PSE
T
1930 LINE(159,141)-(161,146),PSE
T
1940 LINE(162,146)-(162,140),PSE
T
1950 LINE(162,140)-(155,135),PSE
T
1960 LINE(155,135)-(161,135),PSE
T
1970 LINE(161,135)-(160,131),PSE
T
1980 LINE(160,131)-(163,130),PSE
T
1990 LINE(163,130)-(162,130),PSE
T
```

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All programs require a minimum of 32K and 1 disk drive but will take advantage of 64K and multiple drives. Each package features a hi-res 51 x 24 black on green screen. 16K versions available without hi-res screen. Specify 16K or 32K versions when ordering. Future integrated packages will include: Inventory Control, Sales Analysis, Accounts Payable.

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2000 LINE(162,130)-(168,126),PSE
T
2010 LINE(168,126)-(165,123),PSE
T
2020 LINE(165,123)-(166,120),PSE
T
2030 LINE(166,120)-(172,113),PSE
T
2040 LINE(172,113)-(169,110),PSE
T
2050 LINE(169,110)-(168,107),PSE
T
2060 LINE(168,107)-(166,106),PSE
T
2070 LINE(166,106)-(163,109),PSE
T
2080 LINE(163,109)-(164,113),PSE
T
2090 LINE(164,113)-(154,119),PSE
T
2100 LINE(154,119)-(146,122),PSE
T
2110 LINE(146,122)-(146,127),PSE
T
2120 LINE(146,127)-(143,132),PSE
T
2130 LINE(143,132)-(138,133),PSE
T
2140 LINE(138,133)-(136,128),PSE
T
2150 LINE(136,128)-(137,126),PSE
T
2160 LINE(137,126)-(134,124),PSE
T
2170 LINE(134,124)-(133,121),PSE
T
2180 LINE(133,121)-(130,125),PSE
T
2190 LINE(129,125)-(129,131),PSE
T
2200 LINE(129,131)-(128,133),PSE
T
2210 LINE(128,133)-(126,133),PSE
T
2220 LINE(126,133)-(125,126),PSE
T
2230 LINE(125,126)-(127,123),PSE
T
2240 LINE(127,123)-(123,125),PSE
T
2250 LINE(123,125)-(130,121),PSE
T
2260 LINE(130,121)-(123,120),PSE
T
2270 LINE(123,120)-(116,124),PSE
T
2280 LINE(116,124)-(115,121),PSE
T
2290 LINE(115,121)-(125,112),PSE
T
2300 LINE(125,112)-(127,113),PSE
T
2310 LINE(127,113)-(130,114),PSE
T
2320 LINE(130,114)-(130,116),PSE
T
2330 LINE(130,116)-(134,118),PSE
T
2340 LINE(134,118)-(139,119),PSE
T
2350 LINE(139,119)-(140,120),PSE
T
2360 LINE(140,120)-(141,128),PSE
T
2370 LINE(141,128)-(145,127),PSE
T
2380 LINE(123,114)-(101,112),PSE
T
2390 LINE(101,112)-(78,112),PSET
2400 LINE(78,112)-(61,108),PSET
2410 LINE(61,108)-(46,106),PSET
2420 LINE(46,106)-(46,109),PSET
2430 LINE(46,109)-(40,109),PSET
2440 PSET(152,182)
2450 V$(1)="T3O3L4GP255L4.GL5EP2
55L4EL4GP255L4.GL5DL4D"
2460 V$(2)="L4O3GL4.O4EP255L5EL4
DCL4.CO3L4BBO4CDO3BAGO4L2.CP6
2470 V$(3)="T3L4CL4.CO3L5AL4AO4C
L4.CL5O3GL4GGAO4CO3GO4DL2.C"
2480 PLAY V$(1)+"EFGABL2.GP6":PL
AY V$(1)+"O4L4DC#DEO3AL2.O4D":PL
AYV$(2):PLAY V$(3)
2490 FORP=1TO1000:NEXT
2500 RETURN
2510 '***************************
     *** THE STAR SPANGLED  ***
     ***       BANNER       ***
     **************************
2520 V$(1)="O3L8GEL4CEGO4L2CL8ED
L4CO3EF#L2GL8P255L8GP255GL4.O4EL
8DL4CO3L2BL8ABO4L4CP255CO3GEC"
2530 V$(2)="T2O4L8EP255EL4EFGL2G
P255L8FEL4DEFL2P255FP6L4P255FL4.
EL8DL4CO3L2BL8ABL4O4CO3EF#L2GP6"
2540 V$(3)="L4O3GO4CP255CP255L8C
O3BL4AP255AP255AO4DL8FEDCP255L4C
O3BP6"
2550 V$(4)="L8GP255GL4.O4CL6DL7E
FL2GP6L7CDL4.EL5FL4DL2C"
2560 PCLS:PMODE 3,1:SCREEN1,0
2570 COLOR 3
2580 DRAW"BM4,10S8"+TT$+HH$+EE$+
SP$+SS$+TT$+AA$+RR$
2590 DRAW"BM126,11"+SS$+PP$+AA$+
NN$+GG$+LL$+EE$+DD$
2600 DRAW"BM81,30"+BB$+AA$+NN$+N
N$+EE$+RR$
```

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Features include:

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- Up to 2000 characters per record
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- Supports multiple drives
- Nested subfield definitions
- Up to eight fields in primary key
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- View record definition
- Input records with easy to use field name format display
- Edit records with full screen "type over" editor
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- Scan mode for quick data retrieval
- Locate any record by field contents
- Load ELITE•CALC spread sheets into random access data files
- User setable print formats
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- Create "Variable Text Insert" files for ELITE•WORD
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- Data files accessible from BASIC programs
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```
2610 LINE(15,50)-(235,180),PSET,
B
2620 LINE(15,50)-(105,120),PSET,
B
2630 PAINT(16,51),3,3
2640 FOR XX=55 TO 120 STEP 15
2650 FOR ZZ=24 TO 100 STEP 14
2660 CIRCLE(ZZ,XX),2,2
2670 NEXT:NEXT
2680 FOR XX=62 TO 120 STEP 15
2690 FOR ZZ=32 TO 100 STEP 14
2700 CIRCLE(ZZ,XX),2,2
2710 NEXT:NEXT
2720 FOR ZZ=60 TO 120 STEP 10
2730 LINE(105,ZZ)-(235,ZZ),PSET
2740 NEXT
2750 FORZZ=130 TO 180 STEP 10
2760 LINE(15,ZZ)-(235,ZZ),PSET
2770 NEXT
2780 FOR ZZ=51 TO 180 STEP 20
2790 PAINT(233,ZZ),4,3
2800 NEXT
2810 FOR ZZ=61 TO 170 STEP 20
2820 PAINT(233,ZZ),2,3
2830 NEXT
2840 PLAY"T2
2850 PLAYV$(1)+V$(1)+V$(2)
2860 PLAYV$(3)+V$(4)
2870 FORP=1TO500:NEXT
2880 RETURN
2890 '**************************
      ***INITILIZE LETTERS & ***
      ***   OTHER SYMBOLS    ***
      **************************
2900 SP$="BR6"
2910 AA$="BR3U4E2F2D2L4R4D2"
2920 BB$="BR3R3L3U6R3FDGL3R3FDGB
R"
2930 CC$="BR3BUFR3L3HU4ER3BD6"
2940 DD$="BR3R3L3U6R3FD4GBR"
2950 EE$="BR3R4L4U3R3L3U3R4BD6"
2960 FF$="BR3U3R3L3U3R4BD6BL"
2970 GG$="BR3BUFR2EUHLBL2D2U4ER3
BRBD6"
2980 HH$="BR3U6D3R4U3D6"
2990 II$="BR3R4L2U6L2R4BD6"
3000 JJ$="BR3BUFR2EU5BD6"
3010 KK$="BR3U6D3RE3G3F3"
3020 LL$="BR3BU6D6R4BL"
3030 MM$="BR3U6F2E2D6"
3040 NN$="BR3U6DF2F2DU6BD6"
3050 OO$="BR3BUU4ER2FD4GL2HFBR3"
3060 PP$="BR3U6R3FDGL2BD3BR3"
3070 QQ$="BR3BUU4ER2FD4GL2HFR2EH
F2BL"
3080 RR$="BR3U6R3FDGL3R2F2D"
3090 SS$="BR3BUFR2EUHL2HUER2FBD5
"
3100 TT$="BR3BU6R4L2D6BR2
3110 UU$="BR3BU6D5FR2EU5BD6"
3120 VV$="BR3BU6D2FD2FEU2EU2BD6"
3130 WW$="BR3BU6D6E2F2U6BD6"
3140 XX$="BR3UE4UBL4DF4D"
3150 YY$="BR3BU5UDF2E2UDG2D3BR"
3160 ZZ$="BR3BU6R4DG4D1R4
3170 PLUS$="BR5BUU4D2L2R4BRBD3"
3180 MINUS$="BR5BU3R4BD3
3190 MULT$="BR5BUE3BL3F3BLBDBR2"
3200 DIVI$="BR5BU3R4L2BUUBD3DBR2
BD1"
3210 EQUAL$="BR5BU3R4BUL4R4BD4"
3220 EXCLAIM$="BR3BR2UBU2U4BR2BD
7"
3230 QUOTE$="BR3BRBU4U2BR2D2BR2B
D6"
3240 NUMBER$="BR3BU2U4BR2D4URL4B
U2R4BD5BR2"
3250 DOLLAR$="BRBU2R4U2L4U2R4L2U
D6BR3BD"
3260 PRCENT$="BR3BU6DRUBR3G5BR3U
RDBRBD"
3270 APOS$="BR3BRBU6UDGBR3BD5"
3280 LPAREN$="BR5BUHU4EBR2BD6
3290 RPAREN$="BR5EU4HBR2BD6
3300 DASH$="BR3BU3R4BD3"
3310 COMMA$="BR3BRUDGBR3"
3320 PERIOD$="BR3UDBR4"
3330 SLASH$="BR3UEU2EUBD6
3340 LTHAN$="BR3BU3F3H3E3BD6BR"
3350 GTHAN$="BR3BR4BU3G3E3H3BD6B
R4"
3360 CLON$="BR3BRBUUBUUBD4BR2"
3370 SEMI$="BR3EUBU2UBD5BR2"
3380 QMARK$="BR3BR2UBUU2REUHL2GB
D5BR4"
3390 ARROW$="BR3BR2U6G2R4H2BD6BR
2"
3400 ULINE$="BR0BD1R8BU1
3410 N$(1)="BR3BR2R4L2U6G2BD4BR3
"
3420 N$(2)="BR3R4L4U2E1R2E1U1H1L
2G1BD5BR4"
3430 N$(3)="BR3BU1F1R2E1U1H1L1R1
E1U1H1L2G1BD5BR4"
3440 N$(4)="BR6U6G3R4BD3"
3450 N$(5)="BR3BU1F1R2E1U1H1L2H1
U2R4BD6"
3460 N$(6)="BR2BUFR2EUHL2GDU4ER2
FBD5"
3470 N$(7)="BR3U1E3U2L4D1BD5BR3
3480 N$(8)="BR3BR1R2E1U1H1L2G1D1
F1H1U1E1H1U1E1R2F1D1G1F1D1BD1"
3490 N$(9)="BR3BU1F1R2E1U4H1L2G1
D1F1R3BD3"
3500 N$(0)="BR3BUFR2EU4HL2GD4E4B
D5
3510 RETURN
```

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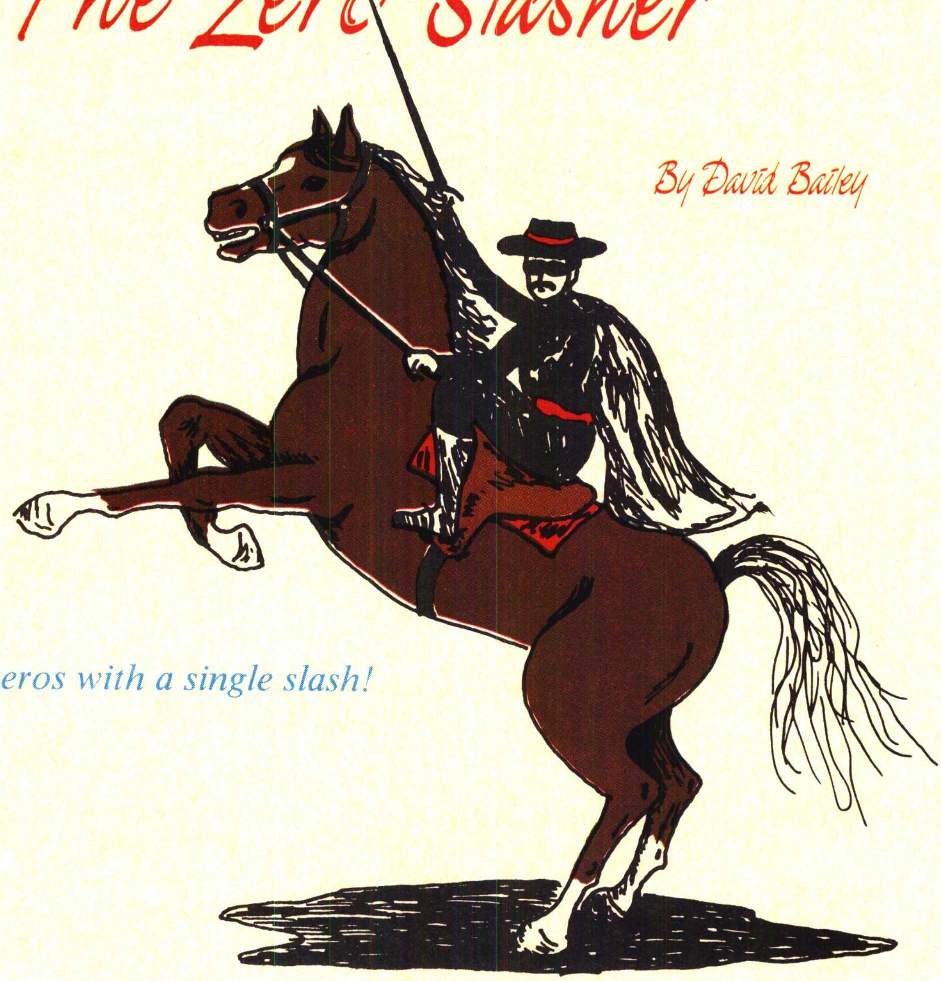
PRINTER UTILITY

16K

Zoro The Zero Slasher

By David Bailey



Distinguish your O's from zeros with a single slash!

The short program which accompanies this article will make your CoCo slash the zeros when outputting to the printer. The program will work with *any* printer, because the routine is contained entirely *within the computer*. It is coded in machine language and is entirely user transparent — to use it, just load and *EXEC*, and all program listings, program outputs, etc., will have the zeros slashed.

The advantage of having a slashed zero is that you can more easily distinguish it from the letter 'O'. This is especially important in program listings where the variable 'O' is used. Typing an 'O' instead of a '0', or vice versa, can crash an entire program, and is very difficult to debug. Slashed zeros are also useful for spreadsheets and other printouts of computations. The reason that many printers do not have a slashed zero built into their character sets is because the slash is not very formal, and is not desired on reports, documents, or other word processing tasks. If a printer was designed to be used with a word processor to create such text, it probably will not have the slash. For this reason, I have made my program flexible — typing *EXEC* toggles the slash "on" and "off," so a BASIC program can use it only at certain times by having *EXECs* within the program.

(David Bailey, a sophomore at Cranston High School East in Cranston, R.I., and a member of the school's computer team, has been programming on the CoCo for 1½ years. He is also the newsletter editor for the New England CoCoNuts Color Computer Club.)

To use the utility program, you must type in one of the following programs. If you have Color BASIC, very carefully type in Listing 1 (the BASIC program) and save it. When you want to use the program, *CLOAD*, type *RUN* and when it is done, type *NEW* and you are ready.

If you have Extended BASIC, but do not have an assembler, you also must type in the BASIC program and save it. However, to make it simpler to use, you can *RUN* it, then type:

```
16K: CSAVEM "SLASH", 16000,16063,16000
32K: CSAVEM "SLASH", 32000,32063,32000
```

If you have disk, change *CSAVEM* to just *SAVEM*. Now, whenever you want the program, just *CLEAR 200,16000 : (C)LOADM "SLASH" : EXEC*. (If you have 32K, change

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- Dynamic margin changes within text
- Select Top margin, Bottom margin, and Page length
- Choose number of duplicate copies
- Page Pause, for single sheet users, if desired
- Optional page numbering begins with any selected page number
- Printer Font codes are user definable
- All printer format options may be changed dynamically within text
- Any string of HEX characters may be imbedded within text to send any special control codes to your printer
- An Eject (top of form) command may be inserted within text
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the *CLEAR* statement to read *CLEAR 200,32000.*) If you had a BASIC program already in memory, it would not be erased by loading "Slash."

If you have an assembler, you can follow the preceding directions, or type in the source code directly. I used *EDTASM+* to create it. If you have this assembler, save the source code by typing *"W SLASH"*, then assemble it with *A SLASH /AO/ WE.* If you have a different assembler, use the equivalent commands to save source code and object code to tape or disk. Now, to load it, follow the instructions for Extended BASIC after the *CSAVEM* instructions.

Regardless of your system and method of loading, all printouts you make at this point will have slashed zeros. If you want to shut it off, type *EXEC*. It can be re-initialized by another *EXEC*, and so forth as many times as you wish.

The BASIC program in Listing 1 was created translating the machine code produced by Listing 2 into decimal, and making a few other adjustments needed because of the lack of an assembler. Therefore, I will explain the machine language program, Listing 2.

The routine to make the slash is really very short. If you delete the remarks, it shouldn't take you more than 10 minutes to type it in, and I suggest you do so if you have an assembler for the learning experience. First of all, we locate the program in high memory (at 16000 for 16K, or 32000 for 32K). The positions I chose waste some memory above the program, but I wanted the even-starting locations for the ease of loading and saving.

Lines 240 to 380 have nothing to do with the slashed zero — their only function is to allow the slash to be toggled on and off by typing *EXEC*. First the routine checks what is in address 360-361, which is the "hook" for BASIC's printing routine. If the contents have already been changed (so that when printing occurs, it will check with the slash routine first), then execution jumps to *INIT1*, where the toggling effect occurs. To toggle, we check the contents of address 359 (Lines 300-310). If it is a 126, then the diversion we put in addressses 360-361 is working, and we want to shut it off. To do this, we put a 57 in location 359 (Lines 330-340). Conversely, if address 359 contains a 57, then the routine has already been toggled off, and we want to turn it on by putting a 126 in that location (Lines 360-370). If addresses 360-361 have not been altered yet (only when the routine is executed the first time), then (Lines 270-280) it is changed to match the starting address of the slash routine. At the end of all three of these possible routines, the program branches to *INIT3*, which returns to BASIC.

The real routine starts at line 430. When the slash is toggled on, the BASIC interpreter automatically jumps to this routine before printing *any* character, to *any* device. First, in Lines 430-450, it checks to see if the output device to be used is the printer. This information is contained in location $6F (a -2 represents the printer, 0 is the screen, etc.). If the device is not the printer, then we branch to *RETURN*, which lets BASIC print whatever character it was going to, and continue on its way. If the device *was* the printer, then we check the character to be printed (it is held in the A register) in Lines 460-470. If it is not a zero, then we also branch to *RETURN*.

Now, if the device was the printer, and the character was a zero, then the routine must be performed. This happens in Lines 510-540. First of all, understand how the slashed zero

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is constructed: a slash is printed (the character next to the right shift key), the printer backspaces one, then prints the regular zero. Line 510 loads the A register with the slash (remember the A register holds the character to be printed) then jumps to the ROM subroutine to print a character (the address of this routine is held in another address, $A002 —this is called "indirect addressing"). We then repeat that procedure, only the character we load A with is going to be the backspace — the #$08 in Line 530. The printer backspaces, then flows to the *RETURN* routine. There, Line 610 automatically returns the zero into the A register, and this zero will be printed over the slash when we tell BASIC to continue on its way in Line 620 with an *RTS*.

This program was written with flexibility in mind. You can create any other character you like if it is formed by overlapping two already existing characters. Just put the character you want to change after the apostrophe in Line 460, then put the character you want to overlap it with after the apostrophe in Line 510. For example, to change the minus sign into the standard division symbol (the bar with a dot above and beneath it) you could put the dash (minus) character in Line 460, and put the colon in Line 510. Please note that when you do this, all minus signs will be printed as division signs when the routine is toggled on. Since you cannot change the toggle in the middle of a *LLIST*, for example, you would not want to list a program that had minuses *and* divisions in it because the minuses would come out like divisions even if you didn't want them to. The routine was originally intended only for redefining characters, and that is the way that it is most useful.

END 232

Listing 1:

```
10 '''''''''''''''''''''''''''''''
20 '        SLASHED ZERO          '
30 '   SLASHES THE ZEROES ON      '
40 'PRINTERS WHICH DO NOT HAVE    '
50 '       THEM BUILT IN          '
60 '                              '
70 '  (C) 1983 BY DAVID BAILEY    '
80 '''''''''''''''''''''''''''''''
90 '
100 CLS:PRINT"DO YOU HAVE:":PRIN
T"   1)  16K":INPUT"   2)  32K";
A
110 IFA=1THENM=16000 ELSEIFA=2TH
ENM=32000 ELSE100
120 POKE1000,M/1000
130 CLEAR200,M:M=PEEK(1000)*1000
140 FOR X=M TO M+63:READ Y:POKE
X,Y:NEXT X
150 DATA190,1,104,140,125,36,39,
8,142,125,36,191,1,104,32,19,182
,1,103,129
160 DATA126,38,7,134,57,183,1,10
3,32,5,134,126,183,1,103,57,52,1
19,246,0,111
```

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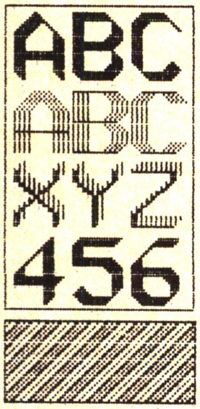

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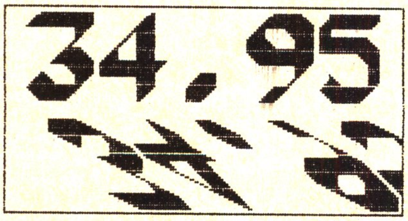

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```
170 DATA193,254,38,16,129,48,38,
12,134,47,173,159,160,2,134,8,17
3,159,160,2,53,119,57
200 S1=M+36:S2=INT(M/256):S3=S1-
(S2*256)
210 POKE M+4,S2:POKE M+5,S3:POKE
 M+9,S2:POKE M+10,S3
220 EXEC M
```

Listing 2:

```
                  00000 ***************************
                  00010 *     SLASHED ZERO        *
                  00020 *                         *
                  00030 * SLASHES THE ZEROES ON *
                  00040 * PRINTERS WHICH DO NOT *
                  00050 *  HAVE THEM BUILT IN     *
                  00060 *                         *
                  00070 * PROGRAM (C) 1983 BY:    *
                  00080 *      DAVID BAILEY       *
                  00090 *      15 COLONIAL AVE.   *
                  00100 *      CRANSTON, RI 02910*
                  00110 ***************************
                  00120 *
                  00130 *LOCATE PROGRAM IN HIGH RAM
                  00140 *"CLEAR200,16000" OR "CLEAR200,32000"
                  00150 * BEFORE LOADING.
                  00160 ****CHOOSE NE OF THE FOLLOING LINES
                  00170 ****ACCORDING TO YOUR MEMORY SIZE
3E80              00180         ORG     16000
                  00190 *       ORG     32000
                  00200 *
                  00210 *INITIALIZE THE PROGRAM (CHANGE
                  00220 *BASIC HOOKS TO USE ROUTINE)
                  00230 *AN "EXEC" TURNS THE SLASH ON AND OFF
3E80 BE   0168    00240 INIT    LDX     >360
3E83 8C   3EA4    00250         CMPX    #START
3E86 27   08      00260         BEQ     INIT1
3E88 8E   3EA4    00270         LDX     #START
3E8B BF   0168    00280         STX     >360
3E8E 20   13      00290         BRA     INIT3
3E90 B6   0167    00300 INIT1   LDA     >359
3E93 81   7E      00310         CMPA    #126
3E95 26   07      00320         BNE     INIT2
3E97 86   39      00330         LDA     #57
3E99 B7   0167    00340         STA     >359
3E9C 20   05      00350         BRA     INIT3
3E9E 86   7E      00360 INIT2   LDA     #126
3EA0 B7   0167    00370         STA     >359
3EA3 39           00380 INIT3   RTS
                  00390 *
                  00400 *MAIN BODY OF PROGRAM
3EA4 34   77      00410 START   PSHS    A,B,X,Y,CC,U    SAVE ALL REG'S
                  00420 *CHECK FOR A "0" GOING TO PRINTER
3EA6 F6   006F    00430         LDB     >$6F    DEVICE #
3EA9 C1   FE      00440         CMPB    #-2     PRINTER?
3EAB 26   10      00450         BNE     RETURN  NO, SO BACK TO BASIC
3EAD 81   30      00460         CMPA    #'0     IS CHAR A ZERO?
3EAF 26   0C      00470         BNE     RETURN  NO, SO BACK TO BASIC
                  00480 *
                  00490 *THE CHARACTER IS A ZERO GOING TO
                  00500 *THE PRINTER, SO PERFORM ROUTINE
3EB1 86   2F      00510         LDA     #'/     READY FOR "/"
3EB3 AD   9F A002 00520         JSR     [$A002] PRINT IT TO PRINTER
3EB7 86   08      00530         LDA     #$08    BACKSPACE PRINTER
3EB9 AD   9F A002 00540         JSR     [$A002] FOR THE ZERO TO
                  00550 *                       OVERLAP THE SLASH
                  00560 *
                  00570 *RETURN TO BASIC: 1)RESTORE REGISTERS
                  00580 *  2)PRINT CHARACTER THAT WAS
                  00590 *    INTENDED, ZERO OR NOT  3) CONTINUE
                  00600 * EXECUTION OF PROGRAM, LIST, ETC.
3EBD 35   77      00610 RETURN  PULS    A,B,X,Y,CC,U    GET REG'S BACK
3EBF 39           00620         RTS     PRINT CHAR & CONT.
          3E80    00630         END     INIT
00000 TOTAL ERRORS
```

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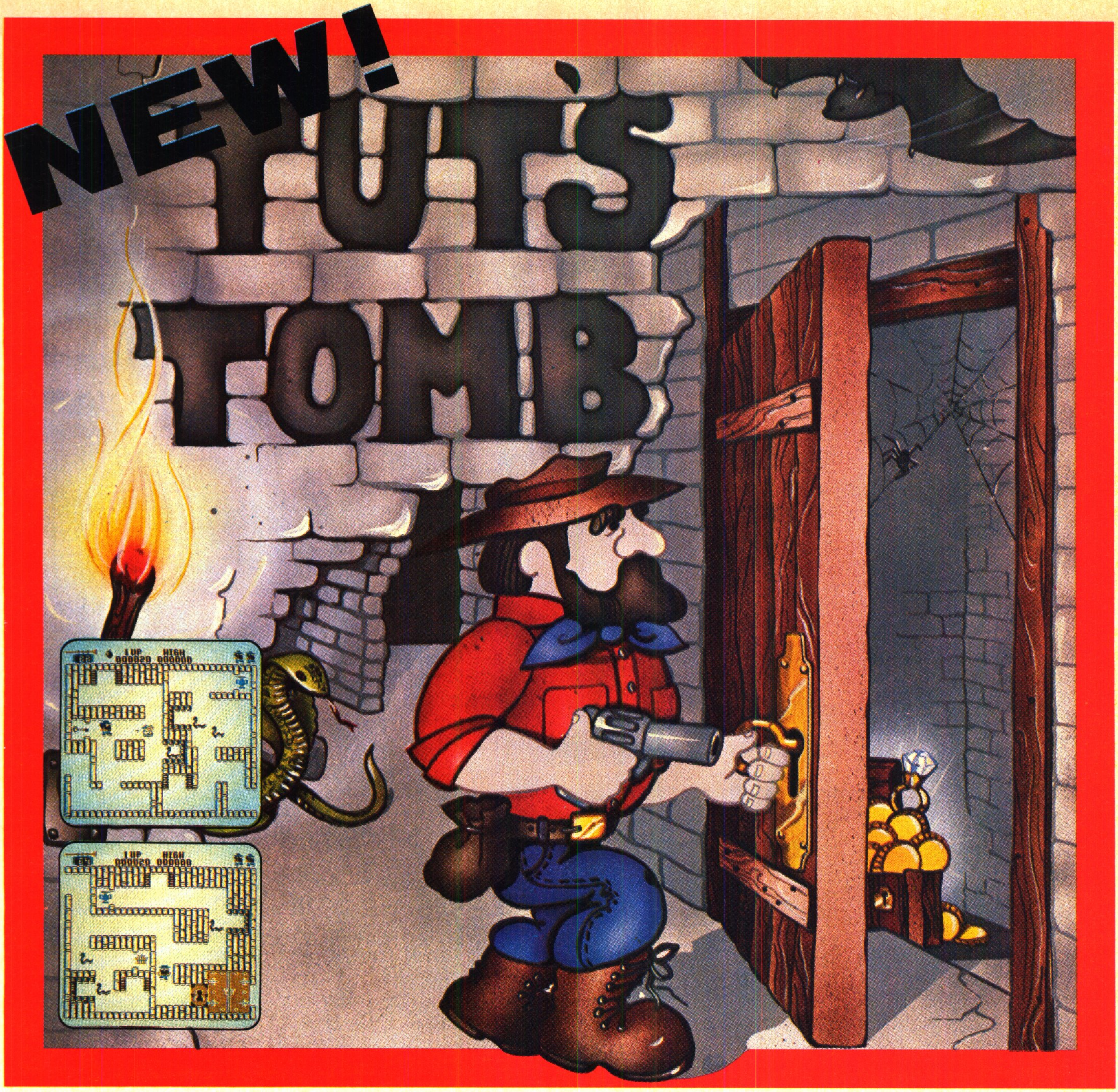

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FEATURE GAME

Computer games are about to enter a new dimension. Now, not only will you be able to hear and see the game you are about to play, but thanks to THE RAINBOW, you will also be able to *smell* the program. Interested? Then read on, and prepare yourself for this "scentuous" experience.

THE ARCONIAX ASSIGNMENT

BY ERIC W. TILENIUS

For as long as you could remember, life had been dull and boring. Somehow you had imagined that once you took a job with the international police you would be plunged into action packed, death defying, bone chilling, brain wracking international crimes. You would be the super crime fighter you had always wanted to become! But, NO! What do you do to earn your paycheck? Answer telephones. Indeed, life with the international police is anything but exciting. You are sheltered in a little office with a phone on your desk and a guard outside the door. You can't even leave the office to go out for pizza. "This is the international police, kid. We have to keep a low profile," your boss always tells you. Not surprisingly, you feel like giving your boss a low profile, to say nothing of what you feel like doing to your little telephone.

Yes, life with the international police is certainly everything but what you yearn for in life. Until yesterday.

Yesterday, your boss called you into his office. "Hey kid," he said, "get over here." So you go into his office, wishing you could wrap a phone cord around his stubby little neck. "Kid, I have something I want you to do," he spits out between big puffs on his cigar.

"Kid, huh?", you think. "I'll show him who's a kid." Yet, there is something in the way he speaks which causes you to retain control of yourself.

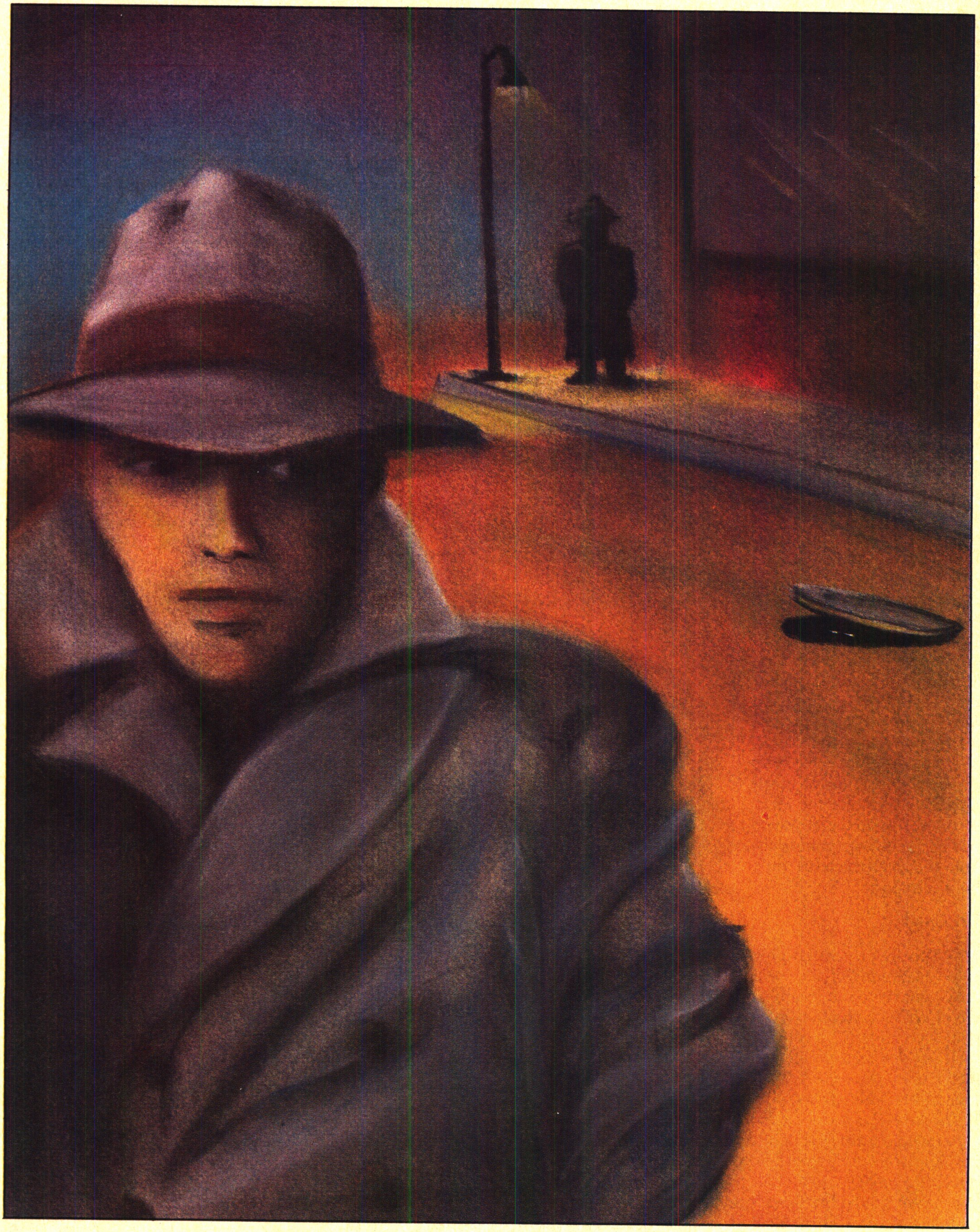
"For eight years now, kid," he begins, "we have been tracking down a ruthless band of terrorists and thieves. Now, however," he continues with a great wave of his hand, "it looks like we got 'em.

(Eric W. Tilenius is a sophomore at Walt Whitman High School in Huntington, Long Island, N.Y. and has been programming and working with computers for several years.)

16K
ECB

32K
ECB

the
RAINBOW



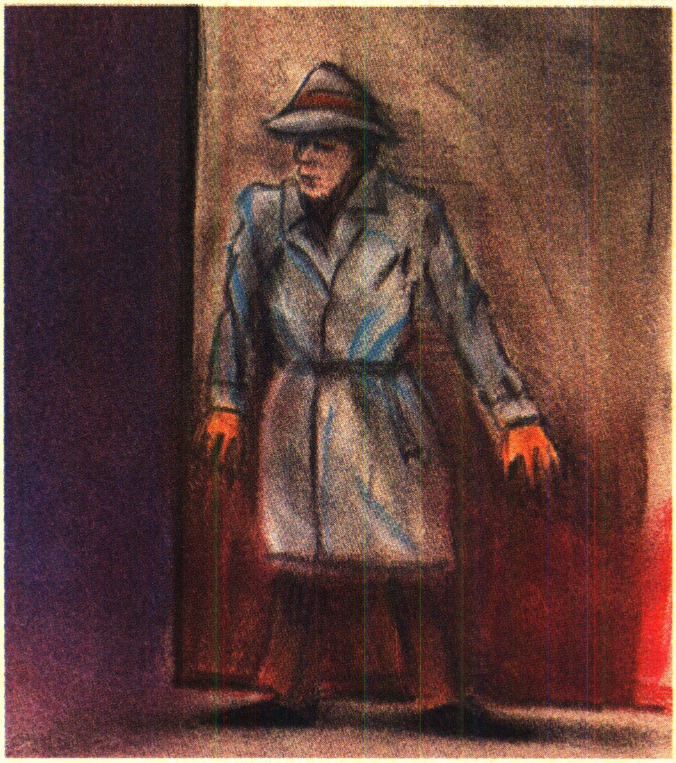
They've finally pulled off a stunt that was just too big for them. Are you familiar with the world's largest diamond?"

Wanting to impress your boss that you have more knowledge than just the number of Anthony's Pizza, you eagerly reply "Certainly, sir." (Somehow the word "sir" just doesn't seem to fit your boss.) "The Cullinan Diamond, mined in the Premier Mine in South Africa in 1905. It is a 3601 carat gem weighing one and a third pounds and . . ."

"Wrong!", your boss answers with glee. "That is, wrong since a *week* ago. Just a *week ago*, the Arconiax Diamond was found. A nice 3937 carat gem, too." (Pausing for a moment, the boss thinks how his girlfriend would simply adore a 3937 carat diamond.) Clearing his throat, he continues, "But before the diamond could be safely locked away, the terrorists got their grubby paws on it."

Putting on the most sincere voice you can muster, you politely inquire, "But what does this have to do with me?"

"You, kid," he replies, "are inauspicious." (Your boss just loves using big words — even when they don't fit.) "They won't suspect you. You are to go to the house of one of the leaders of the group. It's not that far from here. I want you to see if you can get any clues as to the diamond's whereabouts."



"Me? Me? Me! ME!"

"Yes, you. Here's the address. Sneak in, search the place, and then report to me on what you find. And, by the way, try to calm down."

"You know something, boss . . ."

"I know *everything*!", he replies, and dismisses you with a wave of his hand.

You tear back to your office, take one last look at your James Bond 007 picture, and dash off on your assignment.

Unfortunately, the terrorists are as usual, one step ahead of your "most knowledgeable" boss. As you enter the house, two of the gangsters are close behind on your heels. And the excitement is only just beginning . . .

The Game

This is the situation you find yourself in at the beginning of *The Arconiax Assignment*. Your main goal is to successfully track down the Arconiax Diamond, if you can. But don't forget, while you're at it, about your secondary (?!) goal — to stay alive, and in one piece. That may be hard enough. And, in addition, you had better find something to EAT during the game — you are so excited that you left your office without having lunch.

The Arconiax Assignment is an Adventure game, but, as I mentioned before, it is unique in that it lets you experience the game with more than just your sense of sight and sound. It lets you *smell* the game! As you have probably noticed by now, there is a "Scent Sheet" bound into this month's RAINBOW. It consists of six numbered boxes. If you scratch one of these boxes, you will notice that it has a distinct fragrance to it.

At certain points during the game, the computer may tell you, "I found something! (Scratch box number 1)." At this point *you* must use your keen sense of smell to determine what it is that the computer found. Let's say, for example, that you think box number one smells like peanuts. You could then tell the computer to "Take Peanuts" or "Eat Peanuts." (You tell the computer what you want to do by using one- or two-word commands. I'll go into this more later.) All of the scented items play a part in the Adventure. Don't give up if you can't figure out a particular scent at first. You may get more clues as to what it is as the Adventure goes on, or, at any rate, you can always ask your friends for their opinions. I don't think that you should have much trouble, though, as all of the scents are quite distinctive.

To play *The Arconiax Assignment*, you need, at least, a 16K Extended BASIC Color Computer. There are two different versions of the game — one for 16K and the other for 32K.

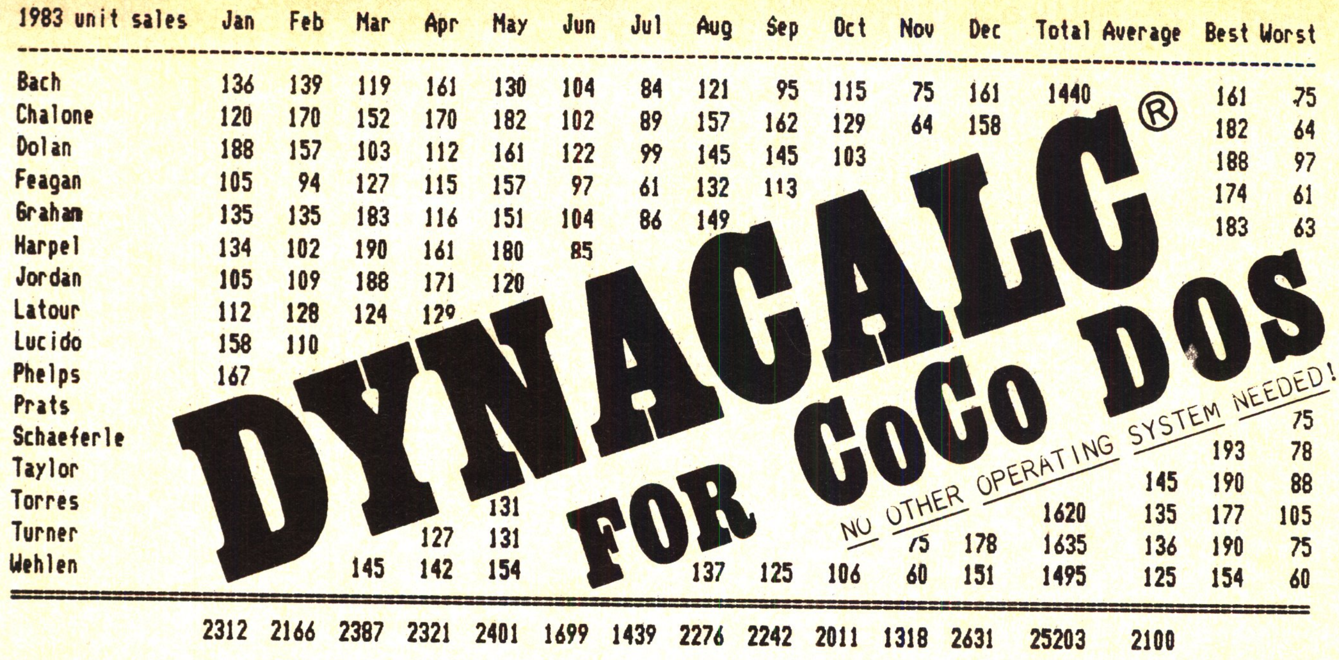
The 16K Version

This version is in the typical Adventure game format. You are told where you are, the objects you see, and the obvious exits. You are then asked for your command. Use a verb alone, such as LOOK, or a verb and a noun, such as LOOK BOTTLE. Type *PCLEAR 1* before loading the program. When the program is *RUN*, a title message is displayed while the program initializes *DATA*. The program then begins. A *SAVE* feature is built in, as is a game *LOAD* command. To save a game, type *SAVE* and to *LOAD* a game back in, type *LOAD*.

If you have 32Kor 64K, you're in for a real treat! this version has a moving title display, instructions, special "window formatting," full paragraph descriptions of your location, VERB and HELP commands, colorful and humorous descriptions of objects that you LOOK at, and more!

First, type in the 32K program listing. (If you are overwhelmed just looking at the listing, there is a great alternative — RAINBOW ON TAPE. Next, save the program either to tape or disk and then type *RUN*. You will be greeted with a moving title display and then asked if you would like instructions. If it is your first time playing, I suggest you answer "Yes" to this question.

The game will then start. On the top portion of your screen will be a description of where you are. This is in full paragraph form — not just a skimpy word or two. For example, instead of just seeing "YOU ARE IN A SMALL HOUSE," the computer will tell you, "YOU ARE IN THE LIVING ROOM OF A COMFORTABLE, SMALL HOUSE. SUNLIGHT FILTERS GENTLY THROUGH



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Dolan	188	157	103	112	161	122	99	145	145	103					188	97
Feagan	105	94	127	115	157	97	61	132	113						174	61
Graham	135	135	183	116	151	104	86	149							183	63
Harpel	134	102	190	161	180	85										
Jordan	105	109	188	171	120											
Latour	112	128	124	129												
Lucido	158	110														
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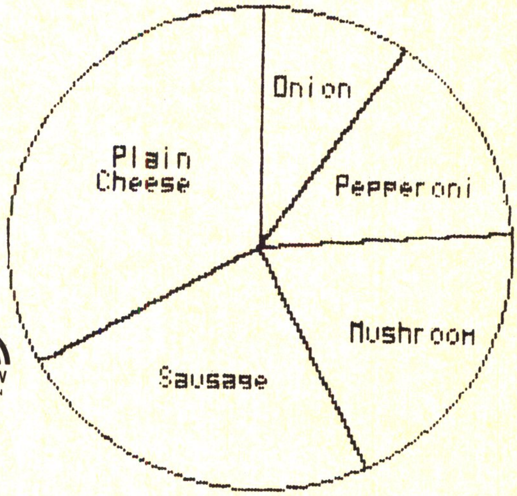

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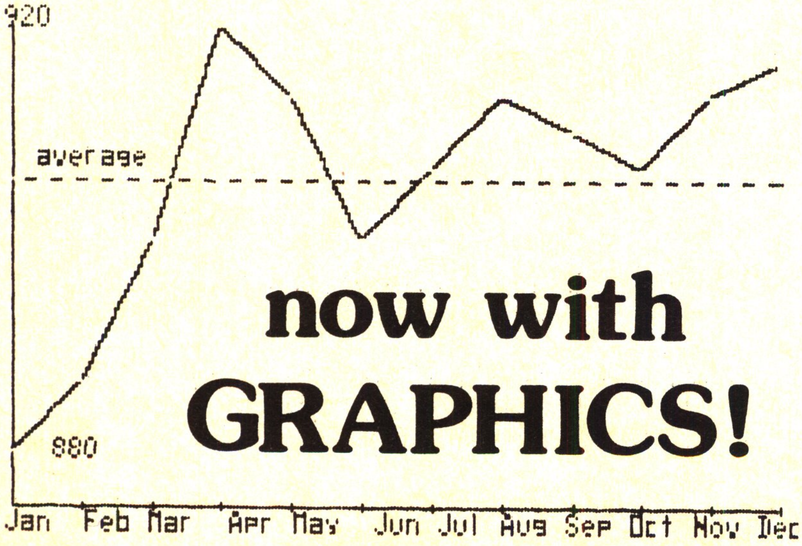
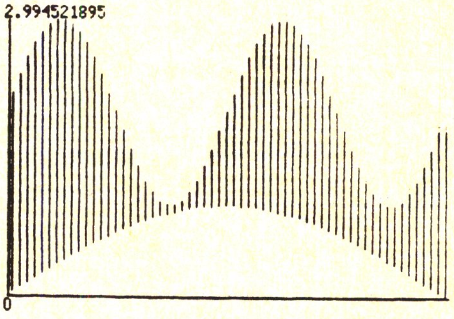


now with GRAPHICS!



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THE WINDOW PANES. A CLOCK SLOWLY TICKS OUT THE TIME. IT IS A WARM, SUNNY AUTUMN AFTERNOON AND THE WHOLE HOUSE FEELS COZY AND SECURE." I think you will agree that this method produces much more of a "flavor" in the Adventure.

In the middle of the screen, the computer will tell you what "VISIBLE OBJECTS" you see. These are objects that are not fixed in the surroundings. They can be taken (usually). The computer will next give you all the obvious exits from that room. Be careful, some exits might not be so obvious. The computer will then ask for "YOUR COMMAND." Type a verb, or a verb and a noun, to tell the computer what you wish to do. If you have trouble, a list of verbs is available by typing "VERB" and clues are available by typing "HELP."

The game has a game save feature. Type *SAVE* to use it. To load back in a game, type *LOAD*.

If you have 32K, this version is well worth the extra typing time!

I hope that you enjoy *The Arconiax Assignment*. It is a novel concept in computer games,so, have fun, and may you successfully "scent out" the hidden location of The Arconiax Diamond.

Scent card is located between Pages 98 and 99.

26	15	170	12	402	60
48	18	190	158	420	252
62	196	240	87	452	208
72	136	270	37	492	92
80	148	306	50	520	164
106	115	324	142	532	9
124	177	346	48	556	150
134	250	370	107	600	181
148	40			END	229

Listing 1 (32K Version):

```
0 GOTO 662
2 ' TO BE USED IN CONJUNCTION
   WITH THE JULY, 1984 RAINBOW
4 '**************************

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   ****************************

6 '--------32K VERSION---------
   ----------------------------
 16K USERS, USE THE 16K VERSION

8 ' --THE ARCONIAX ASSIGNMENT--

10 CLEAR 2900
12 SP$=CHR$(128)
14 X=RND(-TIMER)
16 PR$="the"+SP$+"rainbow"+SP$+"
presents"+SP$:M=1:GOSUB 582
18 PLAY"L7;O2;EBABGBF#BL3E"
20 PR$="an"+SP$+"eric"+SP$+"tile
nius"+SP$+"production"+SP$:GOSUB
 582
22 PLAY"L7;O2;DAGAF#AEAL3D"
24 DATA 67,72,79,67,79,76,65,84,
69,71,85,77,80,73,67,75,76,69,83
,80,69,80,80,69,82,77,73,78,84,8
0,73,78,69,77,79,84,72,66,65,76,
76,83
26 FORC=1 TO 9:READ X:SC$(1)=SC$
(1)+CHR$(X):NEXT:FOR C=1 TO 3:RE
AD X:SC$(2)=SC$(2)+CHR$(X):NEXT:
FOR C=1 TO 7:READ X:SC$(3)=SC$(3
)+CHR$(X):NEXT:FORC=1TO10:READ X
:SC$(4)=SC$(4)+CHR$(X):NEXT:FORC
=1TO4:READ X:SC$(5)=SC$(5)+CHR$(
X):NEXT
28 PR$="get"+SP$+"ready"+SP$+"fo
r"+SP$:GOSUB 582
30 PLAY"L8;O2;EBABGBF#BDAGAF#AEA
CGFGEGDGDAGAF#AEAL2D"
32 PR$="the"+SP$+"arconiax"+SP$+
"assignment"+SP$:GOSUB 582
34 PLAY"O1L2;GEFFL1C"
36 L=1:CM$=STR$(RND(30))+"-"+STR
$(RND(30))+"-"+STR$(RND(30)):CM$
=MID$(CM$,2)
38 RM=19:VB=29:OC=36:DR=0:LK=0:D
```

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```
G=0:HC=80:O1=13:SZ=1
40 DIM L$(20),O$(40),O(40),V(31)
,V$(31),HP$(21),T(20,7),LI(39),D
$(40)
42 CLS:PRINT" THE ARCONIAX ASSIG
NMENT.":PRINT:PRINT" A 'SCENTUOU
S' ADVENTURE GAME   ":PRINT" BY
ERIC W. TILENIUS."
44 SC$(5)=SC$(5)+" BRANCH":FORC=
1 TO 9:READ X:SC$(6)=SC$(6)+CHR$
(X):NEXT
46 PRINT:PRINT"WOULD YOU LIKE IN
STRUCTIONS(Y/N)";:INPUT I$
48 IF LEFT$(I$,1)<>"Y" THEN 64
50 CLS:PR$="THIS GAME IS TO BE U
SED IN CONJUNCTION WITH THE 'SCR
ATCH AND SNIFF' BOXES WHICH APPE
AR IN THE RAINBOW (JULY, 1984).
AT CERTAIN POINTS DURING THE ADV
ENTURE, YOU WILL BE INSTRUCTED T
O 'SCRATCH BOX # 1' OR SOME OTHE
R BOX.":GOSUB 632
52 FOR C=1 TO 4500:NEXT
54 PR$="AT THAT TIME, SCRATCH TH
E SPECIFIED BOX. YOU MUST DETERM
INE WHAT IT IS THAT YOU SMELL AN
D USE IT ACCORDINGLY IN THE GAME
. YOU TELL THE COMPUTER WHAT YOU
 WANT TO DO BY USING TWO WORD CO
MMANDS.":GOSUB 632
56 FOR C=1 TO 4500:NEXT C
58 PR$="FOR EXAMPLE, YOU MIGHT T
YPE 'LOOK BOTTLE' OR 'GO EAST'.
ALL VERBS MAY BE SHORTENED TO TH
E FIRST TWO LETTERS AND ALL NOUN
S TO THE FIRST 3. FOR INSTANCE '
LO BOT' WOULD ACHIEVE THE SAME E
FFECT AS 'LOOK BOTTLE'.":GOSUB 6
32:PLAY"P1;P1;P1;P1"
60 PR$="IF YOU HAVE TROUBLE, YOU
 MAY OBTAIN A LIST OF VERBS BY T
YPING 'VERB'. YOU MAY ALSO GET A
 LITTLE HELP BY TYPING 'HELP'. I
F YOU WANT TO SAVE A GAME TYPE '
SAVE'. TO LOAD AN OLD GAME TYPE
'LOAD'.":GOSUB 632:PLAY"P1;P1;P1
;P1"
62 PR$="YOUR MISSION IS TO RECAP
TURE THE ARCONIAX DIAMOND WHICH
WAS STOLEN BY AN INTERNATIONAL T
ERRORIST GROUP. GOOD LUCK!":GOSU
B 632:PLAY"P1;P1;P1;P1"
64 PR$="I AM INITALIZING THE GAM
E DATA. STAND BY AND PREPARE YOU
RSELF FOR THIS ADVENTURE!":GOSUB
 632
66 DATA"YOU ARE IN THE LIVING RO
OM OF A COMFORTABLE, SMALL HOUSE
. SUNLIGHT FILTERS GENTLY THROUG
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H THE WINDOW PANES. A CLOCK SLOW
LY TICKS OUT THE TIME. IT IS A W
ARM, SUNNY, AUTUMN AFTERNOON AND
 THE WHOLE HOUSE FEELS COZY AND
SECURE."
68 DATA"YOU FIND YOURSELF IN A R
ICHLY DECORATED BEDROOM. THERE I
S AN ANTIQUE BUREAU HERE. ON ONE
 SIDE OF THE ROOM IS A FRESHLY P
AINTED WINDOW. IT IS VERY COMFOR
TABLE HERE, BUT YOU HAVE A NAGGI
NG FEELING THAT SOMEONE IS WATCH
ING YOU."
70 DATA"YOU ARE IN A LOVELY VICT
ORIAN GARDEN. THERE ARE MANY FLO
WERS HERE. A SOFT BREEZE IS BLOW
ING. A TRELLIS RUNS UP THE SIDE
OF THE BUILDING. THERE IS A SPAR
KLING FOUNTAIN HERE IN THE CENTE
R OF THE GARDEN."
72 DATA"THIS IS A SECLUDED SIDE
STREET. YOU SEEM ISOLATED FROM E
VERYONE AND EVERYTHING. THERE AR
E LOW-HANGING TREES HERE WHICH C
UT YOU OFF FROM THE SUN. YOU SUD
DENLY WISH YOU WERE BACK IN THE
NICE BEDROOM."
74 DATA"YOU ARE IN A GRASSY MEAD
OW. A BIG BLACK CAT IS HERE, PRO
BABLY LOOKING FOR SOME JUICY MIC
E. HE WATCHES YOU WITH BIG BLACK
 EYES. OUT IN THE OPEN, THE WIND
 HAS INCREASED AND IS NOW BLOWIN
G QUITE FORCEFULLY."
76 DATA"YOU ARE ON THE ROOF OF T
HE HOUSE. IT IS AN INDUSTRIAL-TY
PE ROOF, WITH GRAVEL SCATTERED A
LL AROUND. FROM HERE YOU CAN GET
 A CLEAR VIEW OF WHERE YOU WERE
AND IT LOOKS LIKE A MANSION. NO
OTHER BUILDINGS ARE IN SIGHT."
78 DATA"YOU ARE STANDING IN FRON
T OF AN OLD TOOLSHED WHICH WAS U
SED TO STORE GARDEN TOOLS. THERE
 IS A DOOR ON THE SHED. NEAR THE
 SHED, YOU SEE A SMALL MOUSEHOLE
. A SIGN OVER THE SHED SAYS 'EXT
ERMINATOR: GET RID OF THE MICE!!
'."
80 DATA"YOU ARE INSIDE THE TOOLS
HED. IT IS DAMP IN HERE AND THE
WHOLE PLACE HAS A MUSTY SMELL. T
HE WALLS ARE ROTTING. MOST OF TH
E GARDEN TOOLS HAVE BEEN REMOVED
 A LONG TIME AGO. IT LOOKS AS IF
 THE PLACE USED TO BE INFESTED B
Y RATS."
82 DATA"THIS IS A NEW, MODERN-LO
```

```
OKING STOREHOUSE USED TO KEEP LA
RGE QUANTITIES OF MEAT. A COMBIN
ATION LOCK HANGS ON THE DOOR WHE
RE THE MEAT IS STORED. I DON'T T
HINK you WOULD LIKE THE RAW MEAT
, ANYWAY."
84 DATA"THIS PLACE CERTAINLY LOO
KS LIKE A HOME FOR MICE. CRUMBS
ARE ALL OVER THE FLOOR, ALONG WI
TH OTHER GARBAGE. IT SMELLS IN H
ERE."
86 DATA"YOU ARE ON A RUSTIC COUN
TRY STREET A SHORT DISTANCE FROM
 THE BUILDING YOU ESCAPED FROM.
EVERYTHING IS STRANGELY QUIET. T
HE STREET IS FILLED WITH POTHOLE
S."
88 DATA"THIS IS A SMALL HIDDEN R
OOM. LIGHT SEEMS TO BE COMING FR
OM NO WHERE, BUT THE WHOLE ROOM
IS BLINDINGLY BRIGHT."
90 DATA"THIS IS ANOTHER RUSTIC C
OUNTRY STREET. THIS STREET, HOWE
VER, HAS BEEN RECENTLY RESURFACE
D AND A SEWER HAS BEEN ADDED TO
HELP DRAINAGE."
92 DATA"YOU ARE ON A RUSTIC COUN
TRY ROAD. THERE IS A MAN HERE. H
E HAS AN UNLIT CIGARETTE HANGING
 OUT OF ONE CORNER OF HIS MOUTH.
 HE SAYS, 'GOT A LIGHT?'"
94 DATA"THIS IS THE NORTH END OF
 MAIN STREET. THE TOWN IS BUSTLI
NG WITH ACTIVITY. THERE SEEMS TO
 BE A CROWD EVERWHERE YOU LOOK."
96 DATA"YOU ARE IN FRONT OF LENN
Y'S ARCADE. LENNY, A VERY FRINDL
Y MAN, WAVES 'HI'. HE COMES OVER
 TO YOU AND ASKS, 'GOT ANYTHING
TO EAT?'"
98 DATA"YOU ARE AT THE ENTRANCE
TO A BUILDING. THE NAME OVER THE
 BUILDING IDENTIFIES IT AS THE '
SSB BUILDING' (WHATEVER THAT IS)
. A GUARD IS HERE. HE SAYS,'SHOW
 SOME I.D.'"
100 DATA"YOU ARE AT GEORGE GILLE
R'S HARDWARE STORE. GEORGE, A GR
UMPY OLD SHOPKEEPER, SHOUTS AT Y
OU 'EITHER BUY SOMTHIN OR GIT OU
T! NO LOITERS ROUND HERE!'. HE L
OOKS MAD!!!"
102 DATA"YOU ARE IN A FABULOUS T
REASURE VAULT! THE ARCONIAX DIAM
OND IS HERE, BUT SO IS A GIGANTI
C MOTH! IT HOVERS OVER THE TREAS
URE, KEEPING WATCH OVER IT!"
104 'OBJECTS
```

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- *Diskette ID name*
- *Date diskette was created*
- *Last date diskette was updated*
- *Filename and extension*
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- *Number of Grans allocated*
- *Number of sectors allocated and used*
- *Machine Language program addresses*

PRO-COLOR-DIR allows for hardcopies of a single diskette's files and has a versatile label printing routine. A global replace function can re-store a diskette's files with deleted files being removed or new ones appended automatically.

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Note: All of our programs have registration cards - If you've purchased one from another dealer, then you should be registered with us. If not, send your name, program ID# and where the program was purchased. We want to keep you informed about changes.

This sheet contains six different scents to be used in the Adventure game called *Arconiax Assignment*. For instructions on the use of this page, please refer to the article. Just scratch a number and sniff.

1

2

3

4

5

6

```
106 DATA HANDWRITTEN NOTE,2,*,0,
*,0,*,0,*,0,GRAVEL,6,AN OLD RUST
Y KEY,0,A BOTTLE,5,*,0,*,0,RAW M
EAT,0,*,0,*,0,A SOLID IRON CROWB
AR,8,A SCRAP OF PAPER,10,,,,,,,,
,,,,,,,A PIECE OF SOMETHING
(SCRATCH BOX #1),10,*,0,*,0,A SO
GGY NEWSPAPER,4
108 DATA A VICIOUS GUARD DOG,4,M
ATCHES,0,HMM...(SCRATCH #5),12,S
OMETHING  STUCK TO YOUR SHOE (SC
RATCH BOX #2),11,,,MONEY,0,A JAR
 OF   SOMETHING (SCRATCH BOX #3)
,15,A STICK OF SOMETHING (SCRATC
H #4),3,SOMETHING FOR SALE (SCRA
TCH #6),18
110 DATA ***THE ARCONIAX DIAMOND
***,19
112 'VERBS
114 DATA GET,1,TAKE,1,LOOK,2,GO,
3,EAT,4,BUY,5,NORTH,3,SOUTH,3,EA
ST,3,WEST,3,UP,3,DOWN,3,HELP,6,,
7,,8,VERB,9,PUSH,10,PULL,10,OPEN
,11,MOVE,10,CLIMB,12,GIVE,13,DRI
NK,4
116 DATA JUMP,14,UNLOCK,15,BREAK
,16,DIAL,15,DROP,13,FILL,17
118 'DESCRIPTIONS
120 DATA"IT SAYS 'YOU ARE OUR PR
ISONER HERE. FEEL FREE TO ROAM T
HE PREMISES, BUT ANY ATTEMPT TO
ESCAPE WILL RESULT IN YOUR death
. YOU WILL BE NOTIFIED WHEN WE H
AVE FURTHER NEED OF YOU. (SIGNED
,) THE SECRET SOCIETY."
122 DATA"AH HA! ONE OF THE DRAWE
RS IF FILLED WITH TONS OF MATCHE
S. THE GUY WHO LIVED HERE MUST H
AVE REALLY BEEN A PYROMANIAC."
124 DATA"IT'S FRESHLY PAINTED AN
D NO MATTER HOW HARD YOU TRY, YO
U CAN'T OPEN IT. THERE IS AN ALA
RM CONNECTED TO IT, BUT I CAN'T
FIGURE OUT HOW TO DEACTIVATE IT.
"
126 DATA"THE FOUNTAIN HAS A STAT
UE OF A DWARF IN THE CENTER, SPO
UTING WATER FROM HIS MOUTH. THE
WATER SPARKLES AND LOOKS INVITIN
GLY WET. SUDDENLY YOU FEEL THIRS
TY."
128 DATA"IT LOOKS FAIRLY STURDY.
 THERE ARE ROSES GROWING ON IT.
IT LOOKS LIKE IT KEEPS GOING UP
FOREVER."
130 DATA"IT'S GRAVEL, WHAT DID Y
OU EXPECT?? WAIT A MINUTE!! WHAT
'S THIS?!?"
```

```
132 DATA"IT'S AN OLD RUSTY KEY.
IT WOULD PROBABLY FIT IN A RUSTY
 LOCK, BUT I DON'T EVEN SEE ANY
REASON WHY ANYTHING AROUND HERE
WOULD BE LOCKED, EVERYTHING IS W
IRED WITH ALARMS."
134 DATA"IT'S A PEPSI BOTTLE. TH
E LABEL ON THE SIDE READS 'DRINK
 PEPSI - THE SODA OF MICHAEL JAC
KSON'. SORRY, THIS TIME YOU HAVE
 NO CHOICE (NO TASTE TESTS.) ANY
WAY, ITS EMPTY."
136 DATA"THE CAT HAS BIG, WATCHF
UL BLACK EYES. A TAG AROUND ITS
NECK BEARS THE NAME 'EXTERMINATO
R'. IT LOOKS AS THOUGH IT WANTS
TO EAT YOU. FORTUNATELY, (OR UNF
ORTUNATELY FOR THE CAT) YOU ARE
TOO BIG TO BE ITS DINNER!!"
138 DATA"IT REQUIRES 3 NUMBERS T
O OPEN. NO AMOUNT OF PRYING WILL
 EVER FORCE THIS ONE OPEN! IT'S
MADE OF 1 INCH THICK STEEL!! EIT
HER YOU HAVE THE COMBINATION OR
YOU'RE OUT OF LUCK."
140 DATA"THE MEAT IS RAW AND LOO
KS LIKE IT WAS MADE FROM ALL THE
 RATS AROUND THIS PLACE. IF I WE
RE YOU, I WOULDN'T TRUST IT."
142 DATA"IT'S SMALL ENOUGH FOR A
 MOUSE. OTHER THAN THAT, WHAT CA
N YOU SAY ABOUT A MOUSEHOLE?"
144 DATA"THE DOOR IS THE ONLY ST
URDY THING ABOUT THE SHED. IT IS
 MADE OF SOLID STEEL. FUNNY, THO
UGH, THE KEYHOLE IS RUSTY, BUT N
OTHING ELSE ON THE DOOR IS."
146 DATA"THE CROWBAR IS MADE OF
IRON. ON IT ARE THE WORDS 'NO PA
IN, NO GAIN'. IT MUST HAVE BELON
GED TO ONE OF THOSE PEOPLE WHO L
OVE TO INFLICT PAIN ON THEMSELVE
S. REMIND ME NOT TO RUN INTO ONE
 OF THOSE GUYS, WILL YA?!?"
148 DATA"THE SCRAP OF PAPER HAS
A COMBINATION ON IT."
150 DATA"I CAN'T SEE THAT FAR"
152 DATA"YOU'LL HAVE TO GO THERE
 YOURSELF."
154 DATA"THE ATLANTIC OCEAN IS T
HAT WAY, BUT I DON'T THINK IT'S
WITHIN WALKING DISTANCE."
156 DATA"ARE YOUR FEET TIRED BY
ANY CHANCE??"
158 DATA"THE SKY IS BLUE. THAT'S
 ABOUT ALL THAT YOU CAN SEE UP T
HERE."
160 DATA"THE GROUND IS DOWN, WHA
```

```
T DID YOU EXPECT TO SEE, HADES??
"
162 DATA"THE SHED IS OLD AND FAL
LING APART. THE TIMBERS ARE ROTT
ING, BUT THE DOOR IS STILL STAND
ING AND IS MADE OF STEEL. IT LOO
KS LIKE IT USED TO BE USED FOR T
OOLS, BUT NOW IT'S DESERTED."
164 DATA"SCRATCH BOX NUMBER ONE
TO SEE WHAT IT IS."
166 DATA"THE WATER LOOKS DELIGHT
FUL. AREN'T YOU THIRSTY???"
168 DATA"THE FLOWERS SMELL DELIG
HTFUL. THERE ARE ROSES AND MUMS
AND ABOUT A HUNDRED OTHER TYPES
OF FLOWERS HERE. I WOULDN'T ADVI
SE PICKING THEM THOUGH, SOMEONE
MIGHT GET MAD."
170 DATA"IT'S TODAY'S EDITION OF
 'USA YESTERDAY'. THE FRONT PAGE
 STORY IS ALL ABOUT THIS GUY WHO
 GOT KIDNAPPED BY THESE TERRORIS
TS WHO HAVE BEEN ELUDING INTERNA
TIONAL POLICE FOR 8 YEARS. HEY!
THAT'S YOU THEY'RE TALKING ABOUT
!!"
172 DATA"THE DOG LOOKS REALLY VI
CIOUS. HE WON'T LET YOU PASS. TH
E LOOK IN HIS EYES TELLS YOU HE'
S REALLY LOOKING FOR A 'LEG DINN
ER', AND IT LOOKS LIKE HE IS EYE
ING your LEG!"
174 DATA"THEY ALL SAY 'LENNY'S V
IDEO ARCADE' ON THEM. THEY CAN B
E USED TO LIGHT THINGS."
176 DATA"IT IS A LONG, THIN STIC
K. MAYBE ONE OF THE KIDNAPPERS U
SES IT TO BEAT HIS KIDS. ANYWAY,
 I HOPE YOU CAN FIND A BETTER US
E FOR IT."
178 DATA"IT'S STICKY."
180 DATA"HOW ABOUT THAT! THERE'S
 MONEY DOWN THERE, BUT YOU CAN'T
 REACH IT WITH YOUR HAND."
182 DATA"IT'S FIFTY CENTS."
184 DATA"THEY ARE GREEN AND SMEL
L OF BRINE."
186 DATA"YUM, THEY REALLY LOOK D
ELICIOUS!!!"
188 DATA"<<COUGH>><<COUGH>> THEY
 REALLY SMELL BAD. BE GLAD YOU'R
E A HUMAN, THOUGH."
190 DATA"THE FAMED TREASURE AT L
AST!"
192 'TRAVEL TABLE
194 T$(1)="NORTH":T$(2)="SOUTH":
```

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```
T$(3)="EAST":T$(4)="WEST":T$(5)=
"UP":T$(6)="DOWN"
196 DATA 0,0,0,1,1,0
198 DATA 0,3,0,0,0,0
200 DATA 2,5,0,0,0,0
202 DATA 0,2,0,0,0,0
204 DATA 3,0,9,7,0,0
206 DATA 0,6,6,0,0,3
208 DATA 0,0,5,0,0,0
210 DATA 0,7,0,0,0,0
212 DATA 0,0,0,5,0,0
214 DATA 7,0,0,0,0,0
216 DATA 0,13,0,4,0,0
218 DATA 0,0,2,0,0,0
220 DATA 11,14,0,0,0,0
222 DATA 13,0,0,0,0,0
224 DATA 15,17,18,16,0,0
226 DATA 0,0,15,0,0,0
228 DATA 15,0,0,0,0,,,,,15,,,,,1
7,,0,0
230 'LIST#
232 DATA 1,2,2,2,2,1,1,1,2,2,1,2
,2,1,1,3,3,3,3,3,3,2,2,2,2,1,2,1
,2,2,2,2,2,2,2,2,2
234 'HELP
236 DATA"THIS IS YOUR HOME. YOU
SHOULDN'T NEED HELP HERE!"
238 DATA"TRY LOOKING AT THINGS."
240 DATA"THIS RHYME MIGHT HELP:
         WHEN IN NEED OF A CHANG
E OF VIEW JUST LOOK AT THE THING
S TO GIVE A CLUE. IF IT'S TOO SO
ON, NEVER GO ON, BUT JUST TRY TO
 SIP FROM A WHITE GLOVED SONG."
242 DATA"HMM...MAYBE 'ROVER' WOU
LD LIKE A STEAK."
244 DATA"NO FIELD MICE AROUND HE
RE. MAYBE LATER ON YOU'LL FIND S
OME. (IF  THIS CLUE DOESN'T MAKE
 SENSE AT FIRST, KEEP TRYING.)"
246 DATA"JUST DON'T JUMP!"
248 DATA"YOU NEED 2 DIFFERENT TH
INGS HERE FOR 2 DIFFERENT PURPOS
ES."
250 DATA"IT'S 5:00P.M. DID YOU B
EAT YOUR HOUSE TODAY???"
252 DATA"MAYBE THEY HID THE COMB
INATION  SOMEWHERE."
254 DATA"DON'T PIG OUT IN HERE."
256 DATA"SCRATCH BOX#2 TO SEE WH
AT IS ON YOUR SHOE."
258 DATA"I HOPE THIS ROOM ISN'T
A GARBAGE COMPACTOR..."
260 DATA"THAT SEWER LOOKS INTERE
STING..."
262 DATA"GIVE THE MAN A LIGHT, A
```

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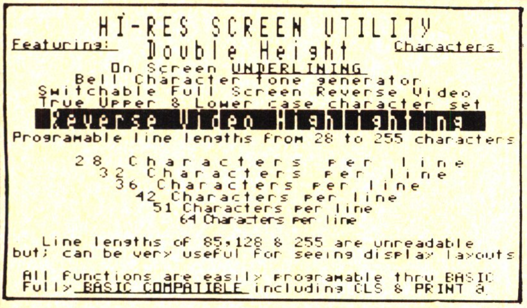
```
LREADY!"
264 DATA"ALWAYS LOOK AT EVERTHIN
G."
266 DATA"LENNY'S IRISH."
268 DATA"LENNY MIGHT BE ABLE TO
HELP."
270 DATA"BUY SOMETHING","THIS ON
E I'LL LEAVE UP TO YOU"
272 'READ DATA
274 FOR C=1 TO RM:READ L$(C):NEX
T
276 FOR C=1 TO OC:READ O$(C),O(C
):NEXT
278 FOR C=1 TO VB:READ V$(C),V(C
):NEXT
280 FOR C=1 TO OC:READ D$(C):NEX
T
282 FOR C=1 TO RM:FOR C1=1 TO 6:
READ T(C,C1):NEXT C1,C
284 FOR C=1 TO OC:READ LI(C):NEX
T
286 FOR C=1 TO RM:READ HP$(C):NE
XT
288 V$="GETALOGOEABUNOSOEAWEUPDO
HESALOVEPUPUOPMOCLGIDRJUUNBRDIDR
FI"
290 O$="NOTBURWINFOUTREGRAKEYBOT
CATLOCMEAMOUDOOCROPAPNORSOUEASWE
SUP DOWSHECHOWATFLONEWDOGMATPING
UMSEWMONPICPEPMOTDIA"
292 'START OF GAME
294 PR$=L$(L):GOSUB 632
296 FL=0
298 PRINT"VISIBLE OBJECTS ARE: "
;:FOR C=1 TO OC:IF O(C)=L THEN P
RINTO$(C);"  ";:FL=FL+1
300 NEXT
302 IF FL=0 THEN PRINT"NOTHING"
304 PRINT
306 IF L=19 AND O(35)<>1000 THEN
 PLAY"P1;P1":PR$="THE MOTH SPOTS
 YOU, HOMES IN ON YOU AND... AAA
AAAARRRRRGGG! YOU'RE D-E-A-D. DO
 TRY AGAIN, THOUGH.":GOSUB 632:P
LAY"P1;P1;P1":CLEAR:END
308 PRINT"OBVIOUS EXITS LEAD:";:
FOR C=1 TO 6:IF T(L,C)>0 THEN PR
INTT$(C);"  ";
310 NEXT
312 IF L=5 AND SZ=0 THEN PR$="TH
E BIG BLACK CAT SUDDENLY POUNCES
! IN ONE FELL SWOOP, YOU ARE DEV
ORED. Y-O-U  A-R-E  D-E-A-D. BUT
 DON'T FEEL BAD, THE CAT THOUGHT
 YOU WERE A VERY TASTY LITTLE MO
USE.":PLAY"P1P1":GOSUB 632:PLAY"
P1;P1;P1":CLEAR:END
314 PRINT@32*15,;
316 PRINT"YOUR COMMAND:";:LINE I
NPUT A$
318 IF A$="PET DOG" THEN A$="TAK
E DOG"
320 IF L=1 THEN PR$="SUDDENLY TW
O MEN WITH GUNS BURST THROUGH YO
UR DOOR, SHATTERING THE SILENCE.
 ONE OF THEM HITS YOU ON THE HEA
D AND YOU FALL TO THE GROUND, UN
CONSCIOUS.":GOSUB 632:PLAY"P1;P1
;P1":L=2:GOTO 294
322 VS=0:SP=INSTR(A$," "):PV$=LE
FT$(A$,2):PN$=MID$(A$,SP+1,3):V1
$=LEFT$(A$,1):VK$=LEFT$(A$,3)
324 IF PV$="" THEN PRINT@32*14,;
:GOTO 316 ELSE IF PV$=LEFT$(PN$,
2) THEN PN$="":VS=1
326 IF VK$="EAT" THEN PV$="EAB"
ELSE IF PV$="E" THEN PV$="EAW" E
LSE IF VK$="LOA" THEN PV$="LOV"
ELSE IF PN$="BUB" THEN PN$=SC$(2
)
328 IF PV$="UN" THEN PV$="UNB" E
LSE IF VK$="DRO"THEN PV$="DRF"
330 IF PV$="RE" THEN PV$="LO" EL
SE IF V1$="I" THEN 572
332 VN=(INSTR(V$,PV$)+1)/2
336 IF VN=0 OR VN<>INT(VN) THEN
PRINT"I DON'T UNDERSTAND THE VER
B.":GOTO 316
337 IFNN=13ANDL=9THEN NN=10
338 NN=(INSTR(O$,PN$)+2)/3:IF VS
=1 THEN 346
340 IF NN=0 OR NN<>INT(NN) THEN
PRINT"I DONT KNOW HOW TO ";A$;".
":GOTO 316
342 IF V(VN)=1 AND NN=24 THEN A$
="FILL BOTTLE":GOTO 322
344 HC=HC-1:IF HC<20 THEN PRINT"
YOU ARE VERY HUNGRY." ELSE IF HC
<5 THEN PRINT"YOU ARE ABOUT TO S
TARVE!" ELSE IF HC=<0 THEN PRINT
"YOU HAVE JUST DIED OF HUNGER!
 T-H-E  E-N-D!":CLEAR:END
346 ON V(VN) GOTO 350,374,392,40
8,426,434,438,458,478,482,488,50
8,514,534,540,560,566
348 PRINT"YOU DON'T REALLY WANT
TO DO      THAT, DO YOU??":GOTO 3
16
350 'TAKE
352 FL=0
354 IF O(NN)=L AND LI(NN)=1 THEN
 O(NN)=1000:PRINTO$(NN)" TAKEN."
:FL=4
356 IF O(27)=4 AND L=4 AND NN=27
 THEN PRINT"THE DOG JUST BIT YOU
R LEG OFF.  YOUR SCREAMS ALERT T
```

HI — RESOLUTION SCREEN UTILITY



```
            HI-RES SCREEN UTILITY
Featuring:   Double Height    Characters
         On Screen UNDERLINING
      Bell Character tone generator
   Switchable Full Screen Reverse Video
   True Upper & Lower case character set
    Reverse Video Highlighting
Programable line lengths from 28 to 255 characters

      28 Characters per line
       32 Characters per line
        36 Characters per line
         42 Characters per line
          51 Characters per line
           64 Characters per line

  Line lengths of 85,128 & 255 are unreadable
but; can be very useful for seeing display layouts

  All functions are easily programable thru BASIC
  Fully BASIC COMPATIBLE including CLS & PRINT @
```

- FULLY BASIC COMPATIBLE
- DISPLAY FORMATS OF 28 to 255 CHARACTERS PER LINE
- FULL 96 UPPER LOWER CASE CHARACTERS
- MIXED GRAPHICS & TEXT OR SEPARATE GRAPHIC & TEXT SCREENS
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- HOME CURSOR & CLEAR SCREEN
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Display Formats 28 to 255 x 24

INTRODUCING

TEXTPRO III

"The Professionals" Word Processing System

64K Support

- **9 Hi-Resolution Display Formats: from 28 to 255 Columns by 24 lines**
- **True Upper/Lower Case Display**
- **Three Programmable Headers**
- **Programmable Footer**
- **Automatic Footnote System**
- **Automatic Memory Sense 16-64K**
- **Up to 48K of Workspace on 64K**
- **10 Programmable Tab Stops**
- **7 Tab Function Commands**
- **Automatic Justification**
- **On Screen Underlining and Double Size Characters**
- **Change Formatting at Any Time**
- **Edit Files Larger Than Memory**
- **Compatible with All Printers**
- **Easily Imbed Any Number of Format and Control Codes**
- **Typist Friendly Line and Command Format Entry**
- **Automatic Key Repeat**

TEXTPRO III is the most advanced Text Editing and Word Processing System available for the Color Computer. One of the reasons for this is, Textpro works in a totally different way than the other Color Computer Word Processing programs. It uses simple 2 character abbreviations of words or phrases for commands. These commands are used at the beginning of a line and are preceeded by a "." period. Several commands can be chained together on the same line for ease of use. Thru these commands you tell the Word Processor how you want the margins set, line length, indenting information, and so on. You can change the way you want a document formatted at any point in the document. You also have the freedom to write without worrying about how long the line is or where the margins are and so on. The Word Processor automatically takes words from one line to the next and fills out the printed line to the desired length. You can even use the command to Input Text from the Keyboard while a document is being processed, and use that information to change the formatting or enter any other valid text Processor command. With this kind of flexibility and an extensive set of commands and functions available, its no wonder that TEXTPRO III is the most advanced Word Processing System.

Screen Formatting

Textpro III has 9 Hi-Resolution Upper/Lower case display formats available, from 28 to 255 characters per line by 24 lines. You also have advanced screen commands such as double size characters and on screen underlining. You can also use the standard 32 by 16 display for systems having lower case hardware kits installed. The display defaults to a 51 by 24 format that is easily switched to any other format available. Along with the Hi-Resolution screen we added automatic repeating keys "Typomatic." The rate is fully adjustable from ultra fast to super slow or can be turned off entirely for your convenience.

64K Support

Textpro III fully supports the use of 64K on the Color Computer. It has fast automatic memory sensing and configures itself accordingly. Textpro III does not require Extended Basic or Flex to take full advantage of a 64K RAM system. On a 64K Disk System there is over 64K of workspace available and files larger than memory are fully supported. Tape based systems have up to 48K available for workspace.

Text Editor

Textpro III has a full featured, line oriented screen editor. It supports single or multiple line copy and move, global or local search and replace of any character string, character insert and delete, block delete, adjustable speed automatic key repeat, single and automatic line edit, programmable underline and double width control coded, change screen background color and line lengths, automatic line numbering, line resequencer, and insert and delete line numbers.

Disk & Tape I/O

Textpro III uses fully compatible ASCII formatted files that do not have to be converted like some of the other Word Processing Systems. It will load, save and verify basic ASCII formatted tape files. The disk version supports Load, Save, Directory, Kill, Append, Text Process file from Disk, Roll part of file to disk and get next portion of file from disk.

DISK $59.95 **TAPE $49.95**

Standard Commands

Textpro III features a whole host of Document Formatting commands. The setup command section includes: Line Length, Top, Left, and Bottom Margins, Page Length, Page Numbering on/off and Automatic Word Fill and Justification on/off.

Some of the vertical control features include: test for number of lines left on the page, skip to next page, set page number, wait at top of page, single and multi line spacing, and skip blank lines.

Textpro III features 3 programmable header lines that can be centered, left or right justified. It also has one programmable footer line. 3 commands for continues, single and paragraph indenting, center text, underline and double width print commands.

Footnotes and Special Commands

Some of the special features allow imbedded control codes to access intelligent printer features like; superscript, subscript, change type font and even graphics. You can even imbed control codes within justified text. There is a command that automatically places footnotes at the bottom of the page, which can be very handy for term papers, etc. Another command allows you to display a message on the screen and input text from the keyboard. This text is then printed as if it has been part of the original text, thus you can produce things like a personalized form letter. There is also a repeat command that allows you to repeat an entire document or a part of one as many times as needed up to 255 times. This can be used to produce mailing labels or combined with the previous command to produce a selected number of personalized form letters.

Tab Functions

Textpro III features an elaborate system of tab commands for complete control over column formatting. There are 10 programmable tab stops that can be defined or re-defined at any time in the text file. They can be used with the following tab commands; Center Over Tab Column, Right Justify to Tab Column, Decimal Align Over Tab Column, Left Justify to Tab Column (Normal Tab) and Horizontal Tab. Tab functions may also be used with a numeric tab column position for maximum flexibility. You can also define the Tab Fill Character to any printable character to fill in the blanks with dots, dashes, etc.

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```
HE KIDNAPPERS, WHO COME. UNFORTU
NATELY, THEY DIDN'T COME TO HELP
 YOU. YOU'RE D-E-A-D.":CLEAR:END
358 IF NN=23 AND O(23)=L THEN PR
INTSC$(1)" TAKEN.":O$(23)=SC$(1)
:O(23)=1000:FL=4
360 IF NN=30 AND O(30)=L THEN PR
INTSC$(2)" TAKEN.":O$(30)=SC$(2)
:O(30)=1000:FL=4
362 IF NN=32 AND L=13 AND LI(32)
=2 THEN 624
364 IF NN=33 AND L=15 AND LI(33)
=2 THEN LI(33)=1:O(33)=1000:PRIN
TSC$(3)" TAKEN.":O$(33)=SC$(3):F
L=4
366 IF NN=29 AND L=12 AND LI(29)
=2 THEN LI(29)=1:O$(29)=SC$(5):O
(29)=1000:PRINTO$(29)" TAKEN":FL
=4
368 IF NN=34 AND L=3 AND LI(34)=
2 THEN LI(34)=1:O$(34)=SC$(4):O(
34)=1000:PRINTO$(34)" TAKEN":FL=
4
370 IF FL<>4 THEN PRINT"CAN'T TA
KE THAT!!"
372 GOTO 316
374 'LOOK
375 FL=0
376 IF PN$="" THEN 294
378 IF O(NN)=L OR O(NN)=1000 OR
LI(NN)=2 OR LI(NN)=3 THEN PR$=D$
(NN):GOSUB 632:FL=1
380 IF FL<>1 THEN PRINT"I DON'T
SEE THAT HERE.":GOTO 316
382 IF NN=6 AND O(7)=0 THEN O(7)
=6
384 IF NN=2 AND O(28)=0 THEN O(2
8)=2
386 IF NN=15 AND (L=10 OR O(15)=
1000) THEN CR=1:PRINTCM$
388 IF NN=31 AND L=13 AND O(32)=
0 THEN O(32)=13:D$(31)="ALL I SE
E IS MUD."
390 GOTO 316
392 'GO
394 IF VN<>4 THEN D=VN-6 ELSE D=
NN-15
396 IF D<1 OR D>6 THEN 400
398 IF T(L,D)>0 THEN L=T(L,D):GO
TO 294 ELSE PRINT"I CAN'T GO THA
T WAY.":GOTO 316
400 IF NN=22 AND DR=2  AND L=7 T
HEN L=8:GOTO 294  ELSE IF NN=22
THEN PRINT"THE DOOR IS IN THE WA
Y.":GOTO 316
402 IF NN=5 AND L=3 THEN L=6:GOT
O 294 ELSE IF NN=5 THEN PRINT"I
DON'T SEE IT HERE.":GOTO 316
404 IF NN=12 AND L=7 AND SZ=0 TH
EN L=10:GOTO 294 ELSE IF NN=12 T
HEN PRINT"YOU ARE TOO BIG!":GOTO
 316
406 PRINT"I CAN'T GO THERE.":GOT
O 316
408 'EAT & DRINK
410 IF NN=11 AND O(11)=1000 AND
L=4 THEN PRINT"THROW IT, DON'T D
RINK IT!!":GOTO 316
412 IF NN=11 AND O(11)=1000 THEN
 O(11)=2000:PRINT"YUCK! RAW MEAT
 TASTES HORRIBLE!":HC=HC+30:GOTO
 316
414 IF (NN=24 OR NN=8 OR NN=4) A
ND (L=3 OR BT=1) THEN SZ=0:PRINT
"YOU HAVE S-H-R-U-N-K! YOU ARE N
OW THE SIZE OF A MOUSE!!":GOTO 3
16
416 IF NN=23 AND (O(23)=L OR O(2
3)=1000) THEN SZ=1:O(23)=0:PRINT
"YOU SUDDENLY G-R-E-W!! YOU ARE
 NOW BACK TO NORMAL SIZE.":FL=-5
6:IF L=10 THEN PRINT"TOO BAD, TH
OUGH, YOU ARE NOW TOOLARGE TO GE
T OUT AND THE EXTERM-INATOR IS H
ERE...":CLEAR:END
418 IF NN=33 AND O(33)=1000 THEN
 O(33)=2000:HC=HC+40:PRINT"<<HIC
```

NO DISK? NO PRINTER?

Disk & printer are **optional** in super-friendly **DO-FILE** system; **needs only tape, 32K & XBASIC!** All work is done in memory. No **programming required** to create household inventory, any list! **You design your own records.** And - you don't have to get it right the first time!! **Expand any field or add a new field without losing data!!** Create, remove, change, search, sort, list, total, & save records. **Educational! 35-page Tutorial** comes with a **sample data file.** Send **$19.95** + $2.00 handling (Check or Money Order) to: **SOLID SOFTWARE, PO Box 712, Levittown, PA Zipcode 19058**

SOLID SOFTWARE

RAINBOW CERTIFICATION SEAL

```
K>>":FL=-56
420 IF NN=34 AND (O(34)=L OR O(3
4)=1000) THEN O(34)=0:PRINT"<<YU
M>>":HC=HC+50:FL=-56
422 IF FL=-56 THEN 316
424 PRINT"YOU CAN'T EAT OR DRINK
 THAT!":GOTO 316
426 'BUY
428 IF O(32)<>1000 THEN PRINT"YO
U HAVE NO MONEY.":GOTO 316
430 IF NN=35 AND L=18 AND LI(35)
=2 THEN LI(35)=1:O$(35)=SC$(6):O
(35)=1000:PRINTO$(35)" BOUGHT.":
GOTO 316
432 PRINT"YOU CAN'T BUY THAT!":G
OTO 316
434 'HELP
436 PR$=HP$(L):GOSUB 632:GOTO 31
6
438 'SAVE
440 CLS:PRINT"GAME SAVE FEATURE
REQUESTED.":PRINT:INPUT"TAPE OR
DISK";DV$
442 IF LEFT$(DV$,1)="D" THEN DV=
1 ELSE DV=-1
444 INPUT"FILENAME";FL$
446 MOTORON:AUDIOON:PRINT"READY
DEVICE AND HIT ENTER.":INPUT Q9$
448 OPEN"O",DV,FL$
450 FOR C=1 TO OC:PRINT#DV,O(C):
NEXT
452 FOR C=1 TO RM:FOR C1=1 TO 6:
PRINT#DV,T(C,C1):NEXT C1,C
454 PRINT#DV,L,HC,DR,LK,SZ
456 CLOSE#DV:PRINT"FILE "FL$" IS
 NOW SAVED.":AUDIOOFF:MOTOROFF:G
OTO 316
458 'LOAD
460 CLS:INPUT"TAPE OR DISK";DV$
462 IF LEFT$(DV$,1)="D" THEN DV=
1 ELSE DV=-1
464 INPUT "FILENAME";FL$
466 MOTORON:AUDIOON:INPUT"READY
DEVICE AND HIT ENTER.";Q9$
468 OPEN"I",DV,FL$
470 FOR C=1 TO OC:INPUT#DV,O(C):
NEXT
472 FOR C=1 TO RM:FOR C1=1 TO 6:
INPUT #DV,T(C,C1):NEXT C1,C
474 INPUT #DV,L,HC,DR,LK,SZ
476 CLOSE#DV:AUDIOOFF:MOTOROFF:G
OTO 294
478 'VERB
480 CLS:FOR C=1 TO VB:PRINTV$(C)
,:NEXT:PRINT"INVENTORY",:GOTO 31
6
482 'PUSH,PULL,OPEN
484 IF NN=2 AND L=2 THEN PRINT"I
T MOVES, REVEALING A HIDDEN     P
ASSAGE TO THE WEST":T(2,4)=12:GO
TO 316
486 PRINT"PUSHING AGAINST THAT D
OES YOU NOGOOD. IT WON'T OPEN.":
GOTO 316
488 'OPEN
490 IF NN=2 THEN A$="LOOK BUREAU
":GOTO 322
492 IF NN=3 THEN PRINT"YOU CAN'T
. IT'S STUCK.":GOTO 316
494 IF NN=10 THEN A$="DIAL LOCK"
:GOTO 322
496 IF NN=22 THEN NN=13
498 IF NN<>13 THEN PRINT"YOU CAN
'T OPEN IT.":GOTO 316
500 IF DR=1 AND L=7 THEN PRINT"C
-R-E-A-K. THE DOOR SWINGS OPEN."
:T(7,1)=8:PLAY"P1":GOTO 294ELSEI
FDR=1THENPRINT"CAN'T"
502 IF DR=2 THEN PRINT"IT'S ALRE
ADY OPEN."
504 IF DR=0 THEN PRINT"IT'S LOCK
ED."
506 GOTO 316
508 'CLIMB
510 IF NN=5 AND L=3 THEN L=6:GOT
O 294
512 PRINT"CLIMBING THAT IS LIKE
```

ENHANCED 1248-EP EPROM PROGRAMMER

Directly compatible with EPROMs 2508, 2716, 2532, 2732, 68732-O-1, 68764 & 64766. No personality modules required. Adapter extends capability for 2564. Menu driven, the 1248-EP is suitable for both experienced and novice operators.

Functions include: 1) ERASURE VERIFICATION; 2) COMPARE EPROM TO REFERENCE; 3) BLOCK PROGRAMMING; 4) BYTE PROGRAMMING; 5) DUMP EPROM TO RAM; 6) JUMP; 7) RETURN TO EPROM MENU.

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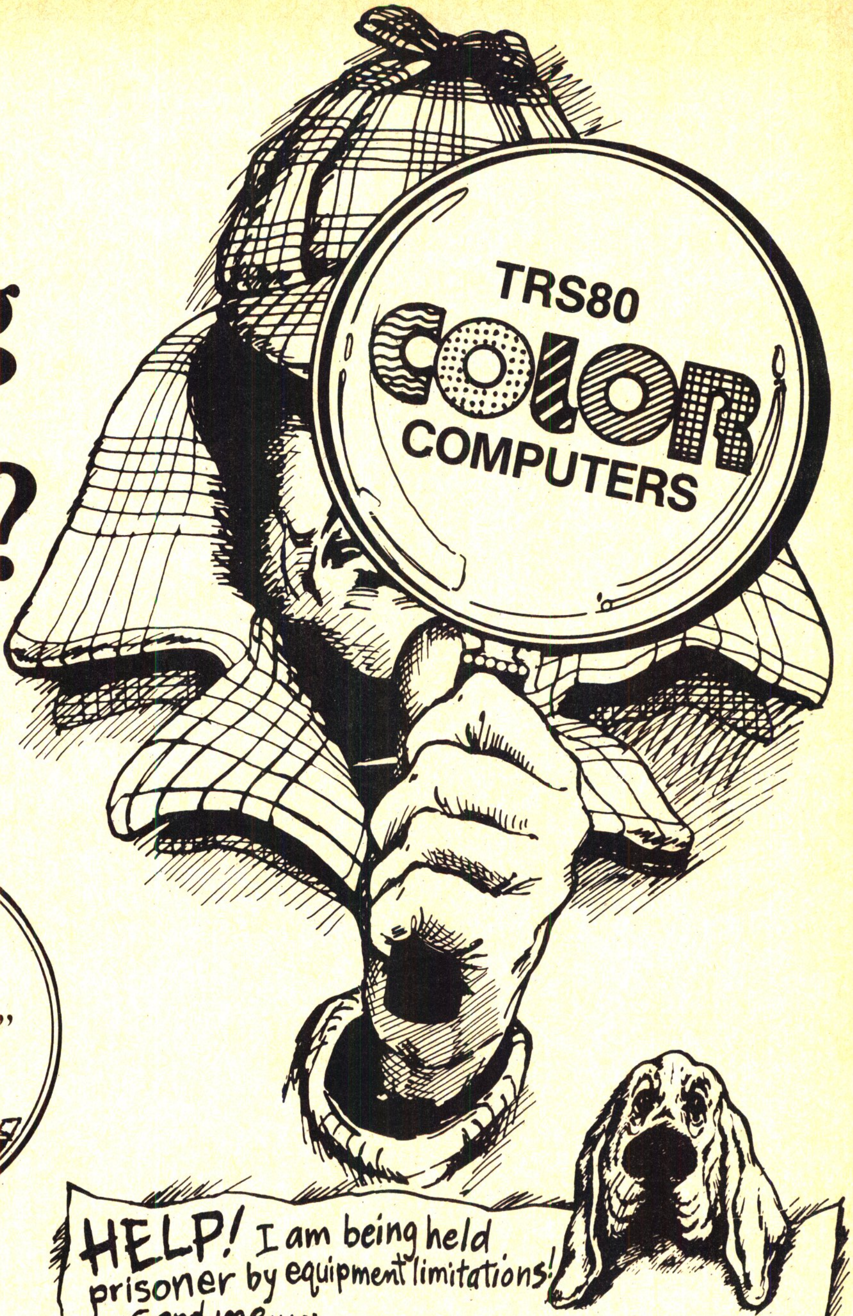
```
TRYING TO CLIMB A WALL OF GLASS
- IT'S    POSSIBLE, BUT STUPID."
:GOTO 316
514 'DROP
516 IF O(NN)=1000 THEN O(NN)=L:P
RINTO$(NN)" DROPPED.":FL=3
518 IF FL=3 AND O(11)=4 AND L=4
THEN PRINT"THE DOG TAKES YOUR GI
FT AND      HURRIES OFF.":T(4,3)=
11:O(11)=2000:O(27)=2000:GOTO 31
6
520 IF FL=3 AND L=14 AND NN=28 T
HEN O(28)=2000:L=15:PR$="THE MAN
 THANKS YOU AND GIVES YOU A RIDE
 INTO THE NEARBY TOWN IN HIS TRU
CK. AS YOU LEAVE, HE WHISPERS 'G
IVE LENNY THE GREEN'. HE THEN DR
IVES AWAY.":GOSUB 632:GOTO 316
522 IF FL=3 AND L=16 AND NN=33 T
HEN O(33)=0:PR$="'THANKS,' SAID
LENNY, 'I'LL TELL YA WHAT. BECAU
SE I LIKE YOU, I'LL GIVE YA SOME
 INFO. THE CODE TO GET IN THE SS
B IS "+O$(6)+". GIVE IT TO THE D
OORMAN.":GOSUB 632:FL=3
524 IF FL=3 AND L=17 AND NN=6 TH
EN O(6)=0:PR$="'O.K.,' SAYS THE
GUARD, 'YOU'RE O.K. THE VAULT IS
 TO THE WEST. O.K.?? (THE GUARD
MUST REALLY LIKE THE WORD 'O.K.'
)":GOSUB 632:FL=3:T(17,4)=19
526 IF NN=35 AND L=19 AND O(35)=
L THEN PR$="THE MOTH WITHERS AWA
Y AND DIES. THE TREASURE IS AT L
AST YOURS! YOU PICK UP THE SPARK
LING GEM AND HEAD FOR HOME. CONG
RATULATIONS! YOUR BOSS EVEN RAIS
ED YOU TO HEAD TELEPHONE OPERATO
R. YOU WON!":FL=3
528 IF FL<>3 THEN PRINT"YOU ARE
NOT CARRYING THAT.":GOTO 316
530 IF FL=3 AND L=19 AND NN=35 T
HEN GOSUB 632:CLEAR:PLAY"V12O2;"
:A$="EBABGBF#BE":B$="DAGAF#AEAD"
:C$="CGFGEGDGC":PLAY"L10;XA$;XB$
;XC$;XB$;XA$;L1E":END
532 GOTO 316
534 'JUMP
536 IF L=6 THEN PRINT"C-R-A-S-H!
! YOU HAVE JUST JUMPEDINTO A PIL
E OF JUNK. UNFORTUNATELY, YOUR K
IDNAPPERS HEARD THE   CLATTER, T
OO.bang! YOU'RE DEAD. DO TRY AGA
IN - UNLESS YOU'RE    CHICKEN.":
CLEAR:END
538 PRINT"YOU JUST JUMPED UP AND
 DOWN.      W-O-W! HAVING FUN????"
:GOTO 316
540 'UNLOCK
```

```
542 IF (NN=22 OR NN=13) AND O(7)
=1000 AND L=7 AND DR=0 THEN DR=1
:PRINT"C-L-I-C-K. THE DOOR UNLOC
KS.":GOTO 316
544 IF (NN=22 OR NN=13) AND (DR=
1 OR DR=2) THEN PRINT"IT'S ALREA
DY UNLOCKED.":GOTO 316
546 IF NN=10 THEN 552
548 IF O(7)<>1000 THEN PRINT"YOU
 DON'T HAVE A KEY."
550 GOTO 316
552 IF L=9 AND CR=1 THEN INPUT"W
HAT'S THE COMBINATION";CO$:IF CO
$=CM$ THEN O(11)=9:LK=1:GOTO 294
554 IF L<>9 THEN PRINT"SORRY, WR
ONG ROOM." ELSE IF L=9 THEN PRIN
T"NOPE. YOU CAN'T OPEN IT"
556 IF CR=1 AND L=9 THEN PRINT"W
ATCH YOUR SPACING. YOU MUST BE E
XACT."
558 GOTO 316
560 'BREAK
562 IF NN=3 AND O(14)=1000 THEN
PRINT"IT SHATTERS INTO A MILLION
 PIECES":T(2,1)=4:GOTO 316
564 PRINT"WHAT'S THE POINT OF VA
NDALIZING THINGS???":GOTO 316
566 'FILL
568 IF L=3 AND O(8)=1000 THEN BT
=1:PRINT"FILLED WITH WATER.":MID
$(D$(8),LEN(D$(8))-5,17)="FILLED
":D$(8)=D$(8)+" WITH WATER.":GOT
O 316
570 PRINT"YOU ARE QUITE UNABLE T
O FILL IT.":GOTO 316
572 'INVENTORY
574 CLS:FOR C=1 TO OC:IF O(C)=10
00 THEN PRINTO$(C)
576 NEXT
578 GOTO 316
580 END
582 'SCREEN TITLE SUBROUTINE
584 LS=INT(LEN(PR$)/2):RS=LEN(PR
$)-LS
586 CLS(CL)
588 GOTO 600
590 FORC=1 TO 80 :NEXT:FOR C=1 T
O 80 :SCREEN0,1:SCREEN0,0:NEXT
592 X=15:Y=0
594 PRINT@7*32+(X-Y),SP$;:IF Y>=
0 THEN Y=Y+1
596 Y=-Y:IF Y<15 THEN GOTO 594
598 RETURN
600 X1=15-LS:X2=16+RS:Y1=0:Y2=14
602 FOR C=4 TO 7
604 CLS0
606 FOR X3=2 TO LEN(PR$)-1 STEP
2
608 PRINT@(Y1+C)*32+X1+X3,MID$(P
```

Sleuthing for Solutions?



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```
R$,X3,1);
610 NEXT X3
612 FOR X3=1 TO LEN(PR$) STEP 2
614 PRINT@(Y2-C)*32+X1+X3,MID$(P
R$,X3,1);
616 NEXT
618 FOR X=1 TO 50:NEXT:PLAY"O2L2
55;CDEDCDEDCEGO3C"
620 NEXT
622 GOTO 590
624 INPUT"WITH WHAT";T1$:INPUT"A
ND WHAT ELSE";T2$
626 T1$=LEFT$(T1$,3):T2$=LEFT$(T
2$,3)
628 IF ((T1$=SC$(2) AND T2$=LEFT
$(O$(29),3)) OR (T1$=LEFT$(O$(29
),3) AND T2$=SC$(2))) AND O(29)=
1000 AND O(30)=1000 THEN PRINT"Y
OU HAVE TAKEN IT.":O(32)=1000:LI
(32)=1:GOTO 316
630 PRINT"SORRY, CAN'T TAKE IT W
ITH THAT.":GOTO 316
632 CX$=CHR$(32):LL=31
634 CO=RND(8)
636 CLS(CO)
638 PRINT@32,;:PRINT TAB(1);
640 IF LEN(PR$)<LL THEN 652
642 FOR CX=LL TO 1 STEP -1
644 IF MID$(PR$,CX,1)=CX$ THEN C
C=CX:GOTO 648
646 NEXT CX:GOTO 652
648 PRINT LEFT$(PR$,CC-1);:PR$=M
ID$(PR$,CC+1):PRINT:PRINTTAB(1);
650 IF LEN(PR$)>LL THEN 642
652 PRINTPR$
654 BL=143
656 BL=BL+(16*(CO-1))
658 FOR C=0 TO 9:PRINT@32*C,CHR$
(BL);:PRINT@32*C+31,CHR$(BL);:NE
XT
660 RETURN
662 PCLEAR 1:GOTO 10
```

90	75	840	60
150	201	910	76
200	244	1090	106
350	105	1230	242
470	52	1322	214
610	8	1440	65
680	169	END	45

Listing 2 (16K Version):

```
10 GOTO 1590
20 ' THE ARCONIAX ASSIGNMENT
      COPYRIGHT (C) 1984
      BY ERIC W. TILENIUS
 --------16K VERSION-----------
 FOLLOW ALL INSTRUCTIONS IN THE
      JULY '84 RAINBOW
30 ' 32K USERS, PLEASE TYPE IN
       THE 32K VERSION.
40 CLEAR 1500
50 DATA 67,72,79,67,79,76,65,84,
69,71,85,77,80,73,67,75,76,69,83
,80,69,80,80,69,82,77,73,78,84,8
0,73,78,69,77,79,84,72,66,65,76,
76,83
60 FORC=1 TO 9:READ X:SC$(1)=SC$
(1)+CHR$(X):NEXT:FOR C=1 TO 3:RE
AD X:SC$(2)=SC$(2)+CHR$(X):NEXT:
FOR C=1 TO 7:READ X:SC$(3)=SC$(3
)+CHR$(X):NEXT:FORC=1TO10:READX:
SC$(4)=SC$(4)+CHR$(X):NEXT
62 FORC=1TO4:READX:SC$(5)=SC$(5)
+CHR$(X):NEXT:SC$(5)=SC$(5)+" BR
ANCH":FORC=1TO9:READX:SC$(6)=SC$
(6)+CHR$(X):NEXT
70 L=1:CM$=STR$(RND(30))+"-"+STR
$(RND(30))+"-"+STR$(RND(30)):CM$
=MID$(CM$,2)
80 RM=19:VB=29:OC=36:DR=0:LK=0:D
G=0:HC=90:O1=13:SZ=1
90 DIM L$(20),O$(40),O(40),V(31)
,T(20,7),LI(39),D$(40)
100 CLS:PRINT"THE ARCONIAX ASSIG
NMENT.":PRINT"16K VERSION.":PRIN
T"BY ERIC W. TILENIUS"
110 DATA IN A TERRORIST'S HOUSE,
IN A RICHLY DECORATED   BEDROOM,
 IN A VICTORIAN GARDEN,ON A SECL
UDED SIDE STREET,IN A GRASSY MEA
DOW,ON THE ROOF OF A HOUSE,IN FR
ONT OF AN OLD       TOOLSHED,INSI
DE A TOOLSHED,BY A STOREHOUSE,IN
SIDE A MOUSEHOLE
120 DATA ON A COUNTRY STREET,IN
A HIDDEN ROOM,ON A COUNTRY STREE
T,ON A COUNTRY STREET - A MAN HE
RE SAYS 'GOT A LIGHT?',ON MAIN S
TREET,BY LENNY'S ARCADE. LENNY I
S HUNGRY,IN FRONT OF THE SSB BUI
LDING - A GUARD SAYS 'SHOW I.D.'
122 DATA BY A STORE,IN THE TREAS
URE VAULT - A GIANT MOTH GUARDS
THE DIAMOND!
130 DATA A NOTE,2,BUREAU,2,WINDO
W,2,FOUNTAIN,3,TRELLIS,3,GRAVEL,
6,KEY,0,BOTTLE,5,CAT,5,COMBINATI
ON LOCK,9,MEAT,9,MOUSEHOLE,7,DOO
R,7,CROWBAR,8,SCRAP OF PAPER,10,
NORTH,0,SOUTH,0,EAST,0,WEST,0,UP
,0,DOWN,0,TOOLSHED,7
140 DATA A PIECE OF SOMETHING (S
CRATCH BOX #1),10,WATER (IN FOUN
TAIN),3,FLOWERS,3,NEWSPAPER,4,GU
ARD DOG,4,MATCHES,0,HMM...(SCRAT
CH #5),12
150 DATA SOMETHING STUCK TO MY S
```

```
HOE (SCRATCH BOX #2),11,SEWER,13
,MONEY,0,A JAR OF SOMETHING (SCR
ATCH BOX #3),15,A STICK OF SOMET
HING (SCRATCH BOX #4),3,SOMETHIN
G FOR SALE (SCRATCH #6),18,**THE
 ARCONIAX DIAMOND**,19
160 DATA 1,1,2,3,4,5,3,3,3,3,3,3
,6,7,8,9,10,10,11,10,12,13,4,14,
15,16,15,13,17
170 DATA IT SAYS 'YOU ARE A PRIS
ONER HERE. TRY TO ESCAPE AND YOU
 DIE!',IT'S FILLED WITH MATCHES,
IT'S STUCK,THERE IS A STATUE OF
A DWARF IN THE CENTER,IT'S STURD
Y,HEY! WHAT'S THIS??,IT'S RUSTY,
IT'S EMPTY,IT'S LOOKING FOR MICE
,NEEDS A COMBINATION
180 DATA IT'S RAW,IT'S SMALL,IT'
S METAL,MADE OF IRON,HAS A COMBI
NATION ON IT,?,?,?,?,?,?,USED TO
 BE USED FOR TOOLS,?,?,THEY SMEL
L NICE,YOU'RE ON THE FRONT PAGE,
HE'S VICIOUS,?,?,IT'S STICKY,I S
EE MONEY DOWN THERE - BUT IT'S O
UT OF REACH
190 DATA FIFTY CENTS,THEY'RE GRE
EN,LOOKS TASTY,SMELLS AWFUL,IT'S
 BEAUTIFUL
200 T$(1)="NORTH":T$(2)="SOUTH":
T$(3)="EAST":T$(4)="WEST":T$(5)=
"UP":T$(6)="DOWN"
210 DATA 0,,,1,1,,,3,,,,,2,5,,,,
,,2,,,,,3,,9,7,,,,6,6,,,3,,,5,,,
,,7,,,,,,,,5,,,7,,,,,,,13,,4,0,0
220 DATA 0,0,2,,,,11,14,,,,,13,,
,,,,15,17,18,16,,,,,15,,,,15,,,,
,0,,,,15,,,,,,,,17
230 DATA 1,2,2,2,2,1,1,1,2,2,1,2
,2,1,1,3,3,3,3,3,3,2,2,2,2,1,2,1
,2,2,2,2,2,2,2,2
240 FOR C=1 TO RM:READ L$(C):NEX
T
250 FOR C=1 TO OC:READ O$(C),O(C
):NEXT
260 FOR C=1 TO VB:READ V(C):NEXT
270 FOR C=1 TO OC:READ D$(C):IF
D$(C)="?" THEN D$(C)="NOTHING SP
ECIAL"
280 NEXT
290 FOR C=1 TO RM:FOR C1=1 TO 6:
READ T(C,C1):NEXT C1,C
300 FOR C=1 TO OC:READ LI(C):NEX
T
310 V$="GETALOGOEABUNOSOEAWEUPDO
HESALOVEPUPUOPMOCLGIDRJUUNBRDIDR
FI"
320 O$="NOTBURWINFOUTREGRAKEYBOT
CATLOCMEAMOUDOOCROPAPNORSOUEASWE
SUP DOWSHECHOWATFLONEWDOGMATPING
```

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```
UMSEWMONPICPEPMOTDIA"
330 'START OF GAME
340 CLSRND(9)-1:PRINT"YOU ARE ";
L$(L)
350 FL=0
360 PRINT"VISIBLE OBJECTS ARE: "
:FOR C=1 TO OC:IF O(C)=L THEN PR
INTO$(C):FL=FL+1
370 NEXT
380 IF FL=0 THEN PRINT"NOTHING"
390 PRINT
400 PRINT"OBVIOUS EXITS LEAD:";:
FOR C=1 TO 6:IF T(L,C)>0 THEN PR
INTT$(C);"  ";
410 NEXT
415 IF L=19 AND O(35)<>1000 THEN
 PRINT"THE KILLER MOTH SLOWLY CR
USHES  YOU. AAARG!":CLEAR:END
420 IF L=5 AND SZ=0 THEN PR$="TH
E CAT SUDDENLY POUNCES! IN ONE F
ELL SWOOP, YOU ARE DEVORED. YOU
ARE DEAD.":PLAY"P1P1":GOSUB 1580
:PLAY"P1;P1;P1":CLEAR:END
430 PRINT@32*15,;
440 PRINT"YOUR COMMAND:";:LINE I
NPUT A$
450 IF A$="PET DOG" THEN A$="TAK
E DOG"
460 IF L=1 THEN PR$="SUDDENLY TW
O MEN WITH GUNS BURSTTHROUGH THE
 DOOR, SHATTERING THE SILENCE. O
NE OF THEM HITS YOU  ON THE HEAD
 AND YOU FALL TO THE GROUND, UNC
ONSCIOUS.":GOSUB 1580:PLAY"P1;P1
;P1":L=2:GOTO 340
470 VS=0:SP=INSTR(A$," "):PV$=LE
FT$(A$,2):PN$=MID$(A$,SP+1,3):V1
$=LEFT$(A$,1):VK$=LEFT$(A$,3)
480 IF PV$="" THEN PRINT@32*14,;
:GOTO 440 ELSE IF PV$=LEFT$(PN$,
2) THEN PN$="":VS=1
490 IF VK$="EAT" THEN PV$="EAB"
ELSE IF PV$="E" THEN PV$="EAW" E
LSE IF VK$="LOA" THEN PV$="LOV"
500 IF PV$="UN" THEN PV$="UNB" E
LSE IF VK$="DRO"THEN PV$="DRF"
510 IF PV$="RE" THEN PV$="LO" EL
SE IF V1$="I" THEN 1490
520 VN=(INSTR(V$,PV$)+1)/2
540 IF VN=0 OR VN<>INT(VN) THEN
PRINT"I DON'T UNDERSTAND THE VER
B.":GOTO 440
550 NN=(INSTR(O$,PN$)+2)/3:IF VS
=1 THEN 590
560 IF NN=0 OR NN<>INT(NN) THEN
PRINT"I DONT KNOW HOW TO ";A$;".
":GOTO 440
570 IF V(VN)=1 AND NN=24 THEN A$
="FILL BOTTLE":GOTO 470
580 HC=HC-1:IF HC<20 THEN PRINT"
YOU ARE VERY HUNGRY." ELSE IF HC
<5 THEN PRINT"YOU ARE ABOUT TO S
TARVE!" ELSE IF HC=<0 THEN PRINT
"YOU HAVE JUST DIED OF HUNGER!
 T-H-E  E-N-D!":CLEAR:END
590 ON V(VN) GOTO 610,700,780,85
0,920,950,960,1050,1140,1150,117
0,1260,1280,1350,1360,1450,1470
600 PRINT"YOU DON'T REALLY WAN'T
 TO DO    THAT, DO YOU??":GOTO 4
40
610 FL=0
620 IF O(NN)=L AND LI(NN)=1 THEN
 O(NN)=1000:PRINTO$(NN)" HAS BEE
N TAKEN.":FL=4
630 IF O(27)=4 AND L=4 AND NN=27
 THEN PRINT"THE DOG JUST BIT YOU
R LEG OFF.  YOUR SCREAMS ALERT T
HE KIDNAPPERS, WHO COME. UNFORTU
NATELY, THEY DIDN'T COME TO HELP
 YOU. YOU'RE D-E-A-D.":CLEAR:END
640 IF NN=23 AND O(23)=L THEN PR
INTSC$(1)" TAKEN.":O$(23)=SC$(1)
:O(23)=1000:FL=4
650 IF NN=30 AND O(30)=L THEN PR
INTSC$(2)" TAKEN.":O$(30)=SC$(2)
:O(30)=1000:FL=4
660 IF NN=32 AND L=13 AND LI(32)
=2 THEN 1540
670 IF NN=33 AND L=15 AND LI(33)
=2 THEN LI(33)=1:O(33)=1000:PRIN
TSC$(3)" TAKEN.":O$(33)=SC$(3):F
L=4
672 IF NN=34 AND L=3 AND LI(34)=
2 THEN LI(34)=1:O(34)=1000:PRINT
SC$(4)" TAKEN.":O$(34)=SC$(4):FL
=4
674 IF NN=29 AND L=12 AND LI(29)
=2 THEN LI(29)=1:O(29)=1000:PRIN
TSC$(5)" TAKEN.":O$(29)=SC$(5):F
L=4
680 IF FL<>4 THEN PRINT"CAN'T TA
KE THAT!!"
690 GOTO 440
700 IF PN$="" THEN 340
705 FL=0
710 IF O(NN)=L OR O(NN)=1000 THE
N PR$=D$(NN):GOSUB 1580:FL=1
720 IF FL<>1 THEN PRINT"I DON'T
SEE THAT HERE.":GOTO 440
730 IF NN=6 AND O(7)=0 THEN O(7)
=6
740 IF NN=2 AND O(28)=0 THEN O(2
8)=2
750 IF NN=15 AND (L=10 OR O(15)=
1000) THEN CR=1:PRINTCM$
760 IF NN=31 AND L=13 AND O(32)=
0 THEN O(32)=13:D$(31)="ALL I SE
```

```
E IS MUD."
770 GOTO 440
780 IF VN<>4 THEN D=VN-6 ELSE D=
NN-15
790 IF D<1 OR D>6 THEN 810
800 IF T(L,D)>0 THEN L=T(L,D):GO
TO 340 ELSE PRINT"I CAN'T GO THA
T WAY.":GOTO 440
810 IF NN=22 AND DR=2  AND L=7 T
HEN L=8:GOTO 340  ELSE IF NN=22
THEN PRINT"THE DOOR IS IN THE WA
Y.":GOTO 440
820 IF NN=5 AND L=3 THEN L=6:GOT
O 340 ELSE IF NN=5 THEN PRINT"I
DON'T SEE IT HERE.":GOTO 440
830 IF NN=12 AND L=7 AND SZ=0 TH
EN L=10:GOTO 340 ELSE IF NN=12 T
HEN PRINT"YOU ARE TOO BIG!":GOTO
 440
840 PRINT"I CAN'T GO THERE.":GOT
O 440
850 IF NN=11 AND O(11)=1000 AND
L=4 THEN PRINT"THROW IT, DON'T D
RINK IT!!":GOTO 440
860 IF NN=11 AND O(11)=1000 THEN
 O(11)=2000:PRINT"YUCK! RAW MEAT
 TASTES HORRIBLE!":HC=HC+30:GOTO
 440
870 IF (NN=24 OR NN=8 OR NN=4) A
ND (L=3 OR BT=1) THEN SZ=0:PRINT
"YOU HAVE S-H-R-U-N-K! YOU ARE N
OW THE SIZE OF A MOUSE!!":GOTO 4
40
880 IF NN=23 AND (O(23)=L OR O(2
3)=1000) THEN SZ=1:O(23)=0:PRINT
"YOU SUDDENLY G-R-E-W!! YOU ARE
 NOW BACK TO NORMAL SIZE.":FL=-5
6:IF L=10 THEN PRINT"TOO BAD, TH
OUGH, YOU ARE NOW TOOLARGE TO GE
T OUT AND THE EXTERM-INATOR IS H
ERE...":CLEAR:END
890 IF NN=33 AND O(33)=1000 THEN
 O(33)=2000:HC=HC+40:PRINT"<<HIC
K>>":FL=-56
892 IF NN=34 AND O(34)=1000 THEN
 O(34)=2000:HC=HC+40:PRINT"<YUM>
":FL=-56
900 IF FL=-56 THEN 440
910 PRINT"YOU CAN'T EAT OR DRINK
 THAT!":GOTO 440
920 'BUY
930 IF O(32)<>1000 THEN PRINT"YO
U HAVE NO MONEY.":GOTO 440
932 IF L=18 AND NN=35 AND LI(35)
=2 THEN LI(35)=1:O(35)=1000:O$(3
5)=SC$(6):PRINTO$(35)" BOUGHT":G
```

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```
OTO 440
940 PRINT"YOU CAN'T BUY THAT!":G
OTO 440
950 PRINT"NOT AVAILABLE IN 16K":
GOTO 440
960 CLS:PRINT"GAME SAVE FEATURE
REQUESTED.":PRINT:INPUT"TAPE OR
DISK";DV$
970 IF LEFT$(DV$,1)="D" THEN DV=
1 ELSE DV=-1
980 INPUT"FILENAME";FL$
990 MOTORON:AUDIOON:PRINT"READY
DEVICE AND HIT ENTER.":INPUT Q9$
1000 OPEN"O",DV,FL$
1010 FOR C=1 TO OC:PRINT#DV,O(C)
:NEXT
1020 FOR C=1 TO RM:FOR C1=1 TO 6
:PRINT#DV,T(C,C1):NEXT C1,C
1030 PRINT#DV,L,HC,DR,LK,SZ
1040 CLOSE#DV:PRINT"FILE "FL$" I
S NOW SAVED.":AUDIOOFF:MOTOROFF:
GOTO 440
1050 CLS:INPUT"TAPE OR DISK";DV$
1060 IF LEFT$(DV$,1)="D" THEN DV
=1 ELSE DV=-1
1070 INPUT "FILENAME";FL$
1080 MOTORON:AUDIOON:INPUT"READY
 DEVICE AND HIT ENTER.";Q9$
1090 OPEN"I",DV,FL$
1100 FOR C=1 TO OC:INPUT#DV,O(C)
:NEXT
1110 FOR C=1 TO RM:FOR C1=1 TO 6
:INPUT #DV,T(C,C1):NEXT C1,C
1120 INPUT #DV,L,HC,DR,LK,SZ
1130 CLOSE#DV:AUDIOOFF:MOTOROFF:
GOTO 340
1140 PRINT"NOT AVAILABLE IN 16K"
:GOTO 440
1150 IF NN=2 AND L=2 THEN PRINT"
IT MOVES, REVEALING A HIDDEN
PASSAGE TO THE WEST":T(2,4)=12:G
OTO 440
1160 PRINT"PUSHING AGAINST THAT
DOES YOU NOGOOD. IT WON'T OPEN."
:GOTO 440
1170 IF NN=2 THEN A$="LOOK BUREA
U":GOTO 470
1180 IF NN=3 THEN PRINT"YOU CAN'
T. IT'S STUCK.":GOTO 440
1190 IF NN=10 THEN A$="DIAL LOCK
":GOTO 470
1200 IF NN=22 THEN NN=13
1210 IF NN<>13 THEN PRINT"YOU CA
N'T OPEN IT.":GOTO 440
1220 IF DR=1 AND L=7 THEN PRINT"
C-R-E-A-K. THE DOOR SWINGS OPEN.
":T(7,1)=8:PLAY"P1":GOTO 340ELSE
 IF DR=1 THEN PRINT"CAN'T"
1230 IF DR=2 THEN PRINT"IT'S ALR
EADY OPEN."
1240 IF DR=0 THEN PRINT"IT'S LOC
KED."
1250 GOTO 440
1260 IF NN=5 AND L=3 THEN L=6:GO
TO 340
1270 PRINT"CLIMBING THAT IS LIKE
 TRUING TO CLIMB A WALL OF GLASS
 - IT'S    POSSIBLE, BUT STUPID.
":GOTO 440
1280 IF O(NN)=1000 THEN O(NN)=L:
PRINTO$(NN)" DROPPED.":FL=3
1290 IF FL=3 AND O(11)=4 AND L=4
 THEN PRINT"THE DOG TAKES YOUR G
IFT AND     HURRIES OFF.":T(4,3)
=11:O(11)=2000:O(27)=2000:GOTO 4
40
1300 IF FL=3 AND L=14 AND NN=28
THEN O(28)=2000:L=15:PR$="THE MA
N THANKS YOU AND GIVES YOU A RID
E INTO THE NEARBY TOWN IN HIS TR
UCK. AS YOU LEAVE, HE WHISPERS '
GIVE LENNY THE GREEN'. HE THEN D
RIVES AWAY.":GOSUB 1580:GOTO 440
1310 IF FL=3 AND L=16 AND NN=33
THEN O(33)=0:PR$="'THANKS,' SAID
 LENNY, 'I'LL TELL YA WHAT. BECA
USE I LIKE YOU, I'LL GIVE YA SOM
E INFO. THE CODE TO GET IN THE S
SB IS "+O$(6)+". GIVE IT TO THE
DOORMAN.":GOSUB 1580:FL=3
1320 IF FL=3 AND L=17 AND NN=6 T
HEN O(6)=0:PR$="'O.K.,' SAYS THE
 GUARD, 'YOU'RE O.K. THE VAULT I
S TO THE WEST. O.K.?? (THE GUARD
 MUST REALLY LIKE THE WORD 'O.K.
')":GOSUB 1580:FL=3:T(17,4)=19
1322 IF FL=3 AND NN=35 AND L=19
THEN 2000
1330 IF FL<>3 THEN PRINT"YOU ARE
 NOT CARRYING THAT.":GOTO 440
1340 GOTO 440
1350 PRINT"CAN'T":GOTO 440
1360 IF (NN=22 OR NN=13) AND O(7
)=1000 AND L=7 AND DR=0 THEN DR=
1:PRINT"C-L-I-C-K. THE DOOR UNLO
CKS.":GOTO 440
1370 IF (NN=22 OR NN=13) AND (DR
=1 OR DR=2) THEN PRINT"IT'S ALRE
ADY UNLOCKED.":GOTO 440
1380 IF NN=10 THEN 1410
1390 IF O(7)<>1000 THEN PRINT"YO
U DON'T HAVE A KEY."
1400 GOTO 440
1410 IF L=9 AND CR=1 THEN INPUT"
WHAT'S THE COMBINATION";CO$:IF C
O$=CM$ THEN O(11)=9:LK=1:GOTO 34
0
1420 IF L<>9 THEN PRINT"SORRY, W
```

```
RONG ROOM." ELSE IF L=9 THEN PRI
NT"NOPE. YOU CAN'T OPEN IT"
1430 IF CR=1 AND L=9 THEN PRINT"
WATCH YOUR SPACING. YOU MUST BE
EXACT."
1440 GOTO 440
1450 IF NN=3 AND O(14)=1000 THEN
 PRINT"IT SHATTERS INTO A MILLON
 PIECES":T(2,1)=4:GOTO 440
1460 PRINT"WHAT'S THE POINT OF V
ANDALIZING THINGS???":GOTO 440
1470 IF L=3 AND O(8)=1000 THEN B
T=1:PRINT"FILLED WITH WATER.":D$
(8)="FILLED WITH WATER.":GOTO 44
0
1480 PRINT"CAN'T.":GOTO 440
1490 'INVENTORY
1500 CLS:FOR C=1 TO OC:IF O(C)=1
000 THEN PRINTO$(C)
1510 NEXT
1520 GOTO 440
1530 END
1540 INPUT"WITH WHAT";T1$:INPUT"
AND WHAT ELSE";T2$
1550 T1$=LEFT$(T1$,3):T2$=LEFT$(
T2$,3)
1560 IF ((T1$=SC$(2) AND T2$=LEF
T$(O$(29),3)) OR (T1$=LEFT$(O$(2
9),3) AND T2$=SC$(2))) AND O(29)
=1000 AND O(30)=1000 THEN PRINT"
YOU HAVE TAKEN IT.":O(32)=1000:L
I(32)=1:GOTO 440
1570 PRINT"SORRY, CAN'T TAKE IT
WITH THAT.":GOTO 440
1580 CLSRND(9)-1:PRINTPR$:PRINT:
RETURN
1590 PCLEAR1:GOTO 40
2000 IF L=19 AND O(35)=19 THEN C
LS3:PRINT"THE MOTH SLOWLY WITHER
S...       AT LAST, THE DIAMOND I
S YOURS!  YOU HAVE WON!!!":FL=2
2010 IF FL=2 THEN CLEAR:FL=3
2012 IF FL=3 THEN FOR C=1 TO 5:P
LAY"L30;O2;CGCACBCO3CO2CBCACGCFC
FCGCGCL4EC":NEXT:PLAY"L2GCC"
2014 END
```

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By Joseph Kolar
RAINBOW Contributing Editor

You never know when an idea will strike. By now, you realize that these fleeting ideas can translate into some creative experiences. Often, they lead to a dead end and deserve an undignified burial. Nevertheless, all ideas demand a newcomer's attention. To a newcomer, everything about the CoCo and its capabilities is grist for his mill. At best, the idea might be the kernel of an exciting learning experience. At worst, the newcomer will amuse himself.

The Color Computer is very versatile. One feature on the cassette-based system is under-utilized by the inhabitants of CoColand. It is the fact that the CTR-80A, or its linear descendant, the CCR-81, can be used in the conventional, noncomputer use.

Rather than use the expensive telephone or the mundane and time-consuming letter, you might consider corresponding via cassette tape recordings.

Here is one method. A cheap, fresh 60-minute cassette tape is labeled side one and dated, popped into the recorder, rewound, set to 000 and fast-forwarded to about 010 to get beyond the leader. The recorder is disconnected from the computer by pulling out the three plugs on the side of the recorder.

Depress play, record and start emoting. This side of the tape is used for general conversation and news. Since I plan to put a demo computer program on the second side of the tape, I give a warning of coming attractions on the flip side.

After the first side is finished, eject the tape and mark the flip side, PROGRAMS or some suitable message. Re-insert the tape on the second side; rewind to 000, reset counter and advance past the leader to about 010; reconnect the computer to the recorder by replacing the plugs. Now, you are on familiar ground! Copy your programs, being sure to leave spaces between copies and making at least two copies of each program.

Now, you have a combination letter/computer program tape. An observation: Often, upon receiving a correspondent's combo-tape, it is difficult to wait for the chatter to end, and the program to begin. To combat this tendency, consider rewinding to the second side and load the first program into the computer. Then rewind back to the first side, pull the connecting plugs and press PLAY to listen to the message. You do know that you can run the program and independently listen to the recording at the same time. This is a good way to check out a program that is annotated with voice comments on side one. Sort of like show and tell.

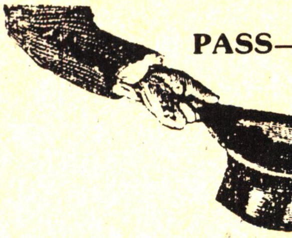
You CoConauts who correspond with each other might consider using this method. Here is the nitty-gritty on posting the cassette. Use a Radio Shack cardboard cassette mailer (Cat. No. 44-632), six for 79 cents. Note the hub holder. Rip it off and fold both ends to a 90 degree angle. Stick each end into a hole in the cassette to lock the tape in position and avoid unwinding the tape during shipment.

Address the face of the mailer; insert the cassette; insert a note giving the name and starting and ending numbers of all the program listings; close ends of container and, if desired, seal with scotch tape. A 37-cent stamp is all the postage required to mail a 60-minute tape. Yes, the post office sells 37-cent stamps. Yes, you can use a 20-cent stamp and a 17-cent stamp. Yes, the post office sells 17-cent stamps. The big spender may stick on two 20-cent stamps.

In a pinch, you can always re-use a cassette mailer by gluing a standard mailing sticker over the face of the container.

(Joseph Kolar is a free-lance writer and programmer dedicated to proselytizing for computers in general, and the CoCo specifically.)

Free



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If you plan to send programs back to your correspondent, it is wise to erase the flip side past the counter number of the end of the last program. Do this before you *CSAVE* over previous programs.

Here is an effective way to erase unwanted programs using the dummy jack. With the CoCo turned on, rewind the flip (program) side to 000 and reset the counter. Insert the dummy plug into the MIC jack. Set the recorder to record, play/record. *CLOAD* ENTER and when it gets past the ending counter number of the last program, stop the recorder and press the Reset button on the computer. Rewind the tape to the beginning. Using this system, you may erase a tape or program without disturbing a program that may be resident in memory. More important, there won't be any sound pick-up from MIC.

Back to the idea to which I was alluding at the beginning of this article. Refer to our article that appeared in the May 1984 issue.

CLOAD either of the two listings. Turn up the sound. *RUN*, *LIST* and on Lines 35, 37, 39, insert *P2* in front of the closing quote. This causes a pause between lines. On Line 39, insert *L2* in front of C. This lengthens the final note. Put a single quote mark in front of Line 217 and if you are using Listing 2, put a *REM* marker, single quote mark, in front of Line 31.

RUN a few times and sing along with the tune. When you think you have it down reasonably well, pop in a fresh cassette; prepare to record; pull out the three jacks to sever the umbilical cord to the CoCo; BREAK, *RUN*; type in the name. As soon as you press ENTER when you input your age, start singing. As soon as you finish your rendition, stop the cassette and BREAK on the computer. Rewind the tape and listen to a real recording artist.

You have created a combo voice/computer music hit song. When you send it off as a greeting to someone, they should be pleasantly impressed, if not with your basso profundo, at least with the concept.

This may give you food for thought. You can see the possibilities this amusing idea suggests. Perhaps, you can create a composition of your own. You can be assured that your correspondent will be intrigued.

Need I remind you to reconnect the computer to the recorder when you are finished?

Musically inclined CoConauts, who can read musical notation, using the powerful play capability of CoCo, can copy any music score and sing along. Give a concert accompanied by the CoCo!

You could create your own composition; write some lyrics; accompany yourself and save the results to tape. There is nothing like a little CoCo-generated music to soothe the soul.

Here is some information that may prove valuable to a reader who ships copies of cassettes through the U.S. mail. You may purchase self-sealing mailers at your local post office. The small, 6" x 9" mailer, ideal for shipping a single cassette, costs 30 cents.

A plastic-boxed, 60-minute cassette with an index card plus three sheets of 8" x 10½" typewriter paper, costs 54 cents to mail first class. No, the post office doesn't have 54-cent stamps. Use some combination of 17, 20, 37 cents stamps.

These envelope mailers have printed FROM and TO areas but it is a good idea to endorse the mailer FIRST CLASS MAIL.

Note that you were asked to alter a listing so you could use it rather than having a shortened listing included with this article. This was deliberately done to get you accustomed to modifying programs. It is a good learning experience.

Always keep the back issues of THE RAINBOW. You never know when you might want to refer to something.

With this article you no longer are confined to singing in the shower. Faithful CoCo is there to assist you whenever you have the urge to sing.

It is hoped that you owners of Extended Color BASIC are encouraged to investigate the play capability of CoCo. Sing, play and have fun!

Finally, the following listing is a little graphics program I created in honor of this third Anniversary issue of THE RAINBOW! It's a fireworks display, so you might want to incorporate it into your Fourth of July festivities, too.

The listing:

```
10 'PAEAN OF JOY ON THE 4TH OF
JULY CREATED ESPECIALLY IN SAL-
UTE TO THE 3RD ANNIVERSARY ISSUE
OF THE 'RAINBOW' BY J. KOLAR
30 PMODE3:PCLS:PMODE4
40 A=126:B=90:R=72:P=1.70
50 DIM S(13)
60 DRAW"BM8,4L4NL4NG3ND4NH3NU4NE
3F3BF9D4NE3NR4NF3ND4NG3NL4H3"
70 GET(0,0)-(20,24),S,G
80 PCLS:SCREEN1,1
90 FOR Q=15 TO 3 STEP-3
100 FORZ=1TO2880 STEPQ:C=Z
110 C=90+C*P/180
120 X=INT(A-6+R*COS(C)):Y=INT(B-
8+R*SIN(C))
130 PUT(X-40,Y)-(X-20,Y+24),S,PS
ET
140 X=INT(A-6+R*SIN(C)):Y=INT(B-
8+R*COS(C))
150 PUT(X+30,Y)-(X+50,Y+24),S,PS
ET
160 NEXT Z,Q:GOTO90
170 RETURN
180 '*** THIS GRAPHIC WILL TAKE
ABOUT 10 MINUTES TO RECYCLE TO
THE BEGINNING.
```

GREETINGS
from
UNCLE
BERT

Greetings!

Summer has begun, as always, with the annual religious pilgrimage of the fleas. Apparently my farm is a "Holy Site" for fleas of a certain persuasion, and it seems that the pig barn remains their holiest shrine. Strange as it may seem, the earliest indications that the pilgrimage has begun appear not in the pig barn itself, but on the very personnage of the primary guardian of that shrine, namely Ben.

It begins innocently enough with a few gloomy, hang-dog expressions and gestures. Ben begins finding excuses to be alone, to slink off into corners, to curl up under beds and tables, to lower himself with a groan to his favorite corner of a room. Then, when he thinks no one is looking or listening, the scratching and chewing begin. The scratching becomes violent — if Ben is next to a wall or piece of furniture, one hears a thump-thump-thump of hock against block. The chewing becomes obsessive — quiet at first, but soon accompanied by agonized snuffles and snorts. Within a few days, Ben has managed to produce bald patches on his back and haunches. One quick look at the bald spots will confirm the annual flea pilgrimage has begun.

Fleas love other animals — dogs and pigs and parrots and such — but they don't seem to like each other very much, I've noticed. Generally, here is what happens when one flea meets another:

```
TO FLEA1
  IF NEAR 2<50 (RT 90 FD 8)
  END
TO FLEA2
  IF NEAR 1<50 (RT 90 FD 8)
  END
```

In spite of their typical avoidance of one another, however, somehow they manage to crawl all over the place and replicate rapidly.

```
TO FLEAS
  HATCH 1 MOVE 4 96 90
  HATCH 2 MOVE 128 0 0
  VANISH
  END
TO MOVE :X :Y :H
  PU
  SX :X SY :Y SH :H
  REPEAT 150 (FD 8 IF ME=1 (FLEA1)
  ELSE (FLEA2))
  FLEAS
  END
```

Well, that's more or less what the fleas look like when they finally appear, either on Ben's bald spots or on the pigs themselves. And you may have noticed that in the TO MOVE procedure I introduced yet another control statement — ELSE. The ELSE statement actually works only in conjunction with an IF statement. As I have demonstrated in some of my past letters, IF can be used by itself, and generally it says to the computer, "If such-and-such is true, do a certain action." The ELSE statement expands that instruction so that it reads: "If such-and-such is true, do a certain action, otherwise do another certain action." Since there are only two basic turtles (fleas) at work, I might have simply used two IF statements, like so:

```
IF ME=1 (FLEA1) IF ME=2 (FLEA2)
```

But the nice thing about ELSE is that it refers to everything else not carried out by the IF. Thus, if I had had five hatched turtles in the TO FLEAS procedure, turtle one would be instructed to carry out FLEA1, but turtles two through five would then be instructed to carry out FLEA2. Try it and see.

* * *

Now the fleas don't know this, and if they did they wouldn't care — but what is a religious pilgrimage to them is an invasion and an annual big nuisance to everyone else. Ben becomes so busy scratching and chewing himself he's not good for much else. Similarly, the pigs become so involved with the fleas crawling all over them that they stop playing, stop eating, and stop just about everything else that's useful. Clearly, we must terminally discourage those fleas. One possible way is to use flea poison. I don't like that because I don't like to use poison in the vicinity of farm animals. Also, the poison seems merely to slow down the fleas a little, but it doesn't really kill them. Let me show you:

```
TO POISON
  PU
  MAKE :X 0 SY 90 SH 90
  WHILE :X<64
  (SLOW 4 FLEA)
  WHILE :X<128
  (SLOW 8 FLEA)
  WHILE :X<192
  (SLOW 16 FLEA)
  WHILE :X<244
  (SLOW 32 FLEA)
  END

TO FLEA
  MAKE :X :X+5
  SX :X
  END
```

By the way, the WHILE statement I just used is very much like the IF statement. IF tests to see if something is true; if it is true, then a certain action (in parentheses) is carried out. Likewise, WHILE tests to see if something is true; if it is true a certain action (in parentheses) is carried out. The difference is that IF tests once, and WHILE tests continually. As long as the condition is true, WHILE will continue to carry out again and again the specified action. For example, in the POISON procedure above, WHILE tests continually for the location of the turtle's X coordinate. While the value of X continues to be less than 64, the computer will continue to carry out the action of SLOW 4 FLEA.

Since WHILE tests continually for a certain condition and causes a specified action to happen continually as long as the condition is true, we can use WHILE to make an action continue forever, merely by specifying a condition that will always be true.

```
TO FLEABITE
   WHILE ME=0
   (SX RANDOM 230
   SY RANDOM 170
   REPEAT 1000 ()
   PRINT “.”)
   END
```

In the above FLEABITE procedure, ME is always 0, since there are no hatched turtles. Thus, the WHILE statement forces the procedure to repeat itself indefinitely. Of course, we could have the same effect by turning FLEABITE into a simple recursion, like so:

```
TO FLEABITE2
   SX RANDOM 230
   SY RANDOM 170
   REPEAT 1000 ()
   PRINT “.”
   FLEABITE
   END
```

But the WHILE statement potentially can give us at least one advantage in this kind of use.* Normally, in an indefinitely repeating procedure such as FLEABITE2, there is no way to stop the procedure except by hitting the BREAK key, at which time the procedure stops — but at the same time we go into the BREAK corridor, and lose our picture. What if we are creating constantly changing pictures with an indefinitely repeating procedure, but we want to be able to stop and look at any of the pictures? Is there any way of stopping without hitting BREAK? Yes, we can combine the WHILE statement with the KEY function.

The KEY function asks the computer to tell us the secret computer code (called the ASCII code) number for whatever key has been pressed on the keyboard. If no key has been pressed, the KEY function yields the value of 0. Thus, with a WHILE KEY=0 we can make a procedure repeat itself indefinitely until we press any standard key on the keyboard. Pressing a standard key on the keyboard means that KEY is no longer 0; the procedure stops; but we can still remain in the RUN room, and thus can still see the RUN screen. Why don't you try it with the FLEABITE procedure?

```
TO FLEABITE3
   WHILE KEY=0
   (SX RANDOM 230
   SY RANDOM 170
   REPEAT 1000 ()
   PRINT “ ”
   END
```

Let me be the first to admit that some people may not be very interested in stopping the FLEABITE procedure to examine a pattern. But what if you're working with real art? For instance, remember the KLEE procedure I described a while back? Wouldn't it be nice to have a KLEE permanently on your screen? You could hang the TV on your living room wall.

Anyhow, fleabites are terrible. They itch, and modern science so far has not come up with the perfect cure for them. That's why poor Ben and the pigs are forced to waste so much time and energy scratching and chewing. I have an idea, however. I propose that we combine the latest in computer technology and lasers to locate and surgically remove the little bites. Locating them is easy since Color LOGO includes the XLOC and YLOC functions for calling up X and Y locations of any turtle (in this case, turtle number 0, the mother turtle).

```
TO LOCATE
   PU SX :X-24 SY :Y-20 SH 90
   PRINT XLOC 0 FD 32 PRINT YLOC 0
   END
```

And using a laser to remove the bites shouldn't be so difficult either.

```
TO LASER
   CLEAR
   END
```

In short, applying modern technology to the age old problem of fleabites may be a perfect solution.

```
TO BITECUREMACHINE
   WHILE KEY=0
   (HT MAKE :X RANDOM 210+20
    MAKE :Y RANDOM 150+20
    SX :X SY :Y
    PRINT “.”
   REPEAT 1000 ()
   HATCH 1 LOCATE
   REPEAT 1000 ()
   LASER)
   END
```

I've used WHILE KEY=0 to make the BITECUREMACHINE repeat indefinitely, until I press any standard key on the keyboard. I might also use WHILE KEY=0 to build a human-operated pause device, by using WHILE to make a meaningless action continue until I press a key. Like so:

```
TO MACHINE
   HT MAKE :X RANDOM 120+20
   MAKE :Y RANDOM 150+20
   SX :X SY :Y
   PRINT“.”
   WHILE KEY=0
   (PU)
   HATCH 1 LOCATE
   REPEAT 1000 ()
   LASER
```

---

* **A second advantage is that WHILE does not use up as much memory as a recursion does.**

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```
  MACHINE
  END
```

Of course, some destructive personage might try to steal the laser from my bite-cure machine and use it as a weapon against fleas. What would happen? We can only speculate, but knowing how tough fleas are, I would guess that a minor microsurgery laser might do nothing but disorient them for a while.

```
TO FLEAINJURE
  PU
  MAKE :N 2
  SX 40 SY 90 SH 90
  WHILE XLOC 0<64
  (SPIRAL1)
  WHILE XLOC 0<128
  (SPIRAL2)
  WHILE XLOC 0<192
  (SPIRAL3)
  WHILE XLOC 0<244
  (SPIRAL4)
  FLEAINJURE
  END

TO SPIRAL1
  FD :N RT 60
  MAKE :N :N+1
  END

TO SPIRAL2
  FD :N LT 60
  MAKE :N :N+1
  END

TO SPIRAL3
  SLOW 10
  FD :N RT 360 LT 360
  RT 60
  MAKE :N :N+1
  END

TO SPIRAL4
  SLOW 20
  REPEAT 4
  (REPEAT 12 (RT 45)
  FD 12 REPEAT 48 (LT 45)
  FD 10)
  END
```

I think that is a reasonable demonstration of a flea in deep trouble. However, I had hoped (with the extra FLEAINJURE at the bottom of the TO FLEAINJURE procedure) that the flea would recycle through the entire sequence. It didn't. I tried to figure out why, and then realized that my last WHILE statement — WHILE XLOC 0<244 — remained permanently true, thus keeping the moving turtle locked into that part of the overall procedure. So, I changed the last WHILE statement to an IF statement, assuring that the procedure would recycle itself. Another thing I found: when the turtle (flea?) did finally recycle it was still carrying the SLOW 20 command from SPIRAL4. So I put a SLOW 0 command at the beginning of SPIRAL1 to cancel out the SLOW 20. Make sense?

All I can say is we better do something about these fleas. Otherwise:

```
TO INFEST
  MAKE :X 20
  SX :X SY 20
  HATCH 1 CRAWL
  SET
  HATCH 2 CRAWL
  SET
  HATCH 3 CRAWL
  SET
  HATCH 4 CRAWL
  SET
  HATCH 5 CRAWL
  SET
  HATCH 6 CRAWL
  SET
  HATCH 7 CRAWL
  SET
  HATCH 8 CRAWL
  SET
  CRAWL
  END

TO CRAWL
  PU
  SLOW 5
  RT 30 FD 10
  REPEAT 6 (RT 60)
  REPEAT 6 (LT 60)
  LT 60 FD 10
  RT 30
  CRAWL
  END

TO SET
  SX XLOC ME + 25
  END
```

Do you have the feeling you've seen more of fleas than you ever wanted to? So do I! So does Ben! So does Bertha! Ditto the pigs! So does everyone down here! I remain,

— Uncle Bert

P.S. You can send your cards and letters to me in care of my good friend Dale Peterson. Just address them like this:

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Exploring The Angles Of BASIC And LOGO

By Don Inman
RAINBOW Contributing Editor

LOGO and BASIC were created for very different purposes. Therefore, comparisons, such as I have made in the May and June issues of THE RAINBOW, mean little in determing which is the best language. I have not been trying to point out the superiority of one or the other.

When you are learning something new, it is quite often helpful to relate it to experiences that you have had in the past. BASIC has been around for a long time. LOGO, the new kid on the block, retains some of the features of BASIC but also has its own features. The purpose of this series of articles is to introduce some of these features using BASIC as a reference.

The rectangle is used in many ways when creating a graphics display. This month's article explores BASIC and LOGO graphics using the rectangle for comparison.

A BASIC Rectangle

There are several ways to draw a rectangle using BASIC. You may "turn on" each point with *PSET* commands:

```
10 PMODE 3: PCLS: SCREEN 1,0
20 Y=10                          <------- set Y
30 FOR X=10 TO 60
40 PSET (X,Y): PSET (X,Y+20)    <----- top & bottom
50 NEXT X
60 X=10                          <------- set X
70 FOR Y=10 TO 20
80 PSET (X,Y): PSET (X+50,Y)    <------- sides
90 NEXT Y
100 GOTO 100
```

You may draw a rectangle using the *DRAW* command:

```
10 PMODE 3: PCLS: SCREEN 1,0
20 DRAW"BM 10,10; R50 D10 L50 U10"
30 GOTO 30
```

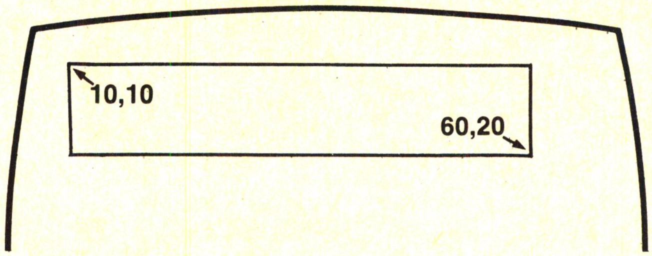
start right down left up

You may also use the *LINE* command with the box (B) option:

```
10 PMODE 3: PCLS: SCREEN 1,0
20 LINE (10,10)-(60,20),PSET,B
30 GOTO 30
```

upper left lower right make a box

All three of these methods draw the same rectangle.



A LOGO Rectangle

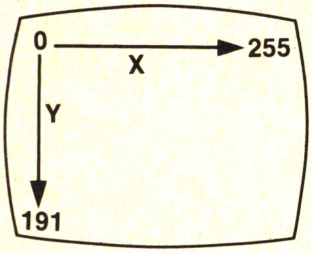
The turtle drawings of LOGO most closely resemble the BASIC method that uses the *DRAW* command. A turtle procedure that draws a similar rectangle could be:

(Don Inman is a co-author of a series of booklets for Radio Shack titled Color LOGO Guide for Teachers. *He is a former teacher and is presently a full-time author with the DYMAX bunch.)*

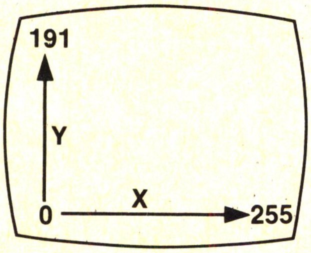
```
TO RECTANGLE
  CLEAR PU HT                          ← lift pen, hide turtle
  SX 10 SY 180                         ← set X and Y
  RT 90 PD                             ← turn right, lower pen
  REPEAT 2(FD 50 RT 90 FD 10 RT 90)← draw rectangle
END
```

The resulting rectangle would look like those drawn in BASIC. However, note that the LOGO screen begins with Y = 0 at the bottom of the screen.

BASIC SCREEN



LOGO SCREEN



Color-filled Rectangles

Rectangles can be filled with color by Extended Color BASIC very easily by using the Fill option with the *LINE* command or by using the *PAINT* command in conjunction with any rectangle drawing method. LOGO does not have any easy way to fill an enclosed figure with color. However, it can be done by coloring each line inside the rectangle.

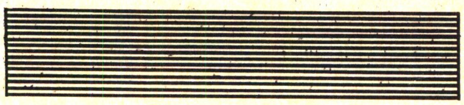
BASIC:

```
  20 LINE(10,10) — (60,20),PSET,BF
              or
  20 DRAW"BM10,10;R50D10L50U10"
  30 PAINT(15,15),4,4
```

LOGO:

```
  PC 2 SX 10 SY 180
  REPEAT 4(FD 50 RT 90
    FD 1 RT 90 FD 50 LT 90
    FD 1 LT 90)
  FD 50
```

BASIC and LOGO produce similar rectangles. However, the colors produced are not the same.



A Practical Program

The following BASIC program and LOGO procedures show the use of rectangles in producing a bar graph. Notice that BASIC uses subroutines in a similar way that LOGO uses subprocedures. The main program, or procedure, in each language is written as a series of subroutines, or subprograms, so that you can easily compare how the two languages produce similar results for each part of the program.

BAR GRAPH

BASIC PROGRAM

```
100 REM * MAIN PROGRAM *
110 PMODE 3: PCLS: SCREEN 1,0
120 CLEAR 1000: DIM L$(21)
130 GOSUB 1000
140 GOSUB 2000
150 GOSUB 3000 'DRAW BOTTOM
160 GOSUB 4000 'DRAW TITLE
170 GOSUB 5000 'DRAW SIDES
180 GOSUB 6000 'DRAW BARS
190 GOTO 190
```

LOGO PROGRAM

```
TO GRAPH
  CLEAR  HT
  RECT
  BOTTOM
  TITLE
  SIDES
  BARS
END
```

BASIC PROGRAM

```
1000 REM * ASSIGN LETTERS *
1010 L$(1)="R8U4L8U4R8BD8BR8" 'S
 OR 5
1020 L$(2)="U4NR8U4R8D8BR8" 'A
1030 L$(3)="NU8R8BR8" 'L
1040 L$(4)="NR8U4NR8U4R8BD8BR8"
'E
1050 L$(5)="U8F4E4D8BR8" 'M
1060 L$(6)="U8F8NU8BR8" 'N
1070 L$(7)="U8R8D4L4NL4F4BR8" 'R
1080 L$(8)="NR8U8R8BD8BR8" 'C
1090 L$(9)="NR8U8R8D8BR8" 'O OR
0
1100 L$(10)="NR6U8R8F2D4G2BR10"
'D
1110 L$(11)="NU2R8NU8BR8" 'J
```

LOGO PROGRAM

LOGO can mix text and graphics. Therefore, no LOGO commands here.

```
1120 L$(12)="NU8R8NU8BR8" 'U
1130 L$(13)="U4NU4R8NU4D4BR8" 'H
1140 L$(14)="BR4NU8BR12" '1
1150 L$(15)="BU8R6D2G6R8BR8" '2
1160 L$(16)="NR8BU4NR8BU4R8D8BR8
" '3
1170 L$(17)="BU4NU4R4NU4ND4R4BD4
BR8" '4
1180 L$(18)="NR8U8R8BD4NL8D4BR8"
 '6
1190 L$(19)="BU4NE4F4BR12" '<
1200 L$(20)="BR4BU8F4G4BR12" '>
1210 L$(21)="BU4R8BD4BR8" '-
1220 RETURN
```

```
2000 REM * DRAW RECTANGLE *
2010 LINE(80,148)-(249,10),PSET,
B
2020 RETURN
```

```
TO RECT
  SX 80  SY 42
  REPEAT 2(FD 138 RT 90
    FD 166 RT 90)
END
```

```
3000 REM * BOTTOM *
3010 DRAW"BM96,160;S2"+L$(14)+"B
R48"+L$(15)+"BR48"+L$(16)+"BR48"
+L$(17)+"BR48"+L$(1)
3020 DRAW"BM96,172;"+L$(1)+"BR22
"+L$(2)+"BR22"+L$(3)+"BR22"+L$(4
)+"BR22"+L$(1)+"BR22"+L$(5)+"BR2
2"+L$(2)+"BR22"+L$(6)
3030 RETURN
```

```
TO BOTTOM
  SX 99  SY 32  SH 90
  PRINT"1   2   3   4   5"
  SX 10:8  SY 20
  PRINT"S A L E S M A N"
END
```

```
4000 REM * TITLE *
4010 DRAW"BM96,22;"+L$(11)+L$(12
)+L$(6)+L$(4)+"BR20"+L$(1)+L$(2)
+L$(3)+L$(4)+L$(1)+"BR20"
4020 DRAW L$(7)+L$(4)+L$(8)+L$(9
)+L$(7)+L$(10)
4030 RETURN
```

```
TO TITLE
  SX 94  SY 164
  PRINT"JUNE SALES RECORDS"
END
```

```
5000 REM * SIDES *
5010 DRAW"BM56,132;"+L$(14)+L$(9
)+L$(21)
5020 DRAW"BM56,116;"+L$(15)+L$(9
)+L$(21)
5030 DRAW"BM56,100;"+L$(16)+L$(9
)+L$(21)
5040 DRAW"BM56,84;"+L$(17)+L$(9)
+L$(21)
5050 DRAW"BM56,68;"+L$(1)+L$(9)+
L$(21)
5060 DRAW"BM56,52;"+L$(18)+L$(9)
+L$(21)
5070 DRAW"BM8,80;"+L$(1)+L$(2)+L
$(3)+L$(4)+L$(1)
5080 DRAW"BM8,92;"+L$(19)+L$(13)
+L$(6)+L$(10)+L$(20)
5090 RETURN
```

```
TO SIDES
  SX 56  SY 60  PRINT"10-"
  SY 76  PRINT"20-"
  SY 92  PRINT"30-"
  SY 108  PRINT"40-"
  SY 124  PRINT"50-"
  SY 140  PRINT"60-"
  SX 8  SY 120  PRINT"SALES"
  SY 108  PRINT"(HND)"
END
```

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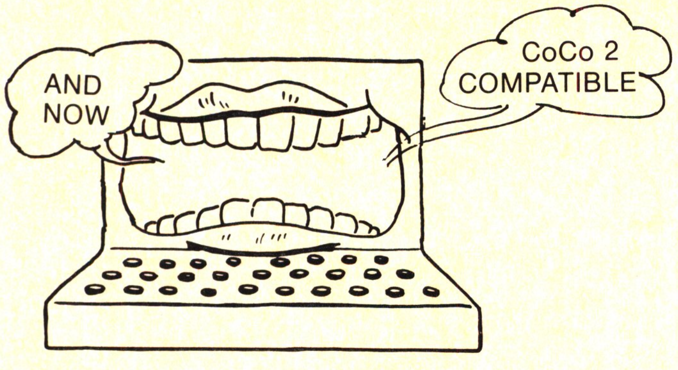

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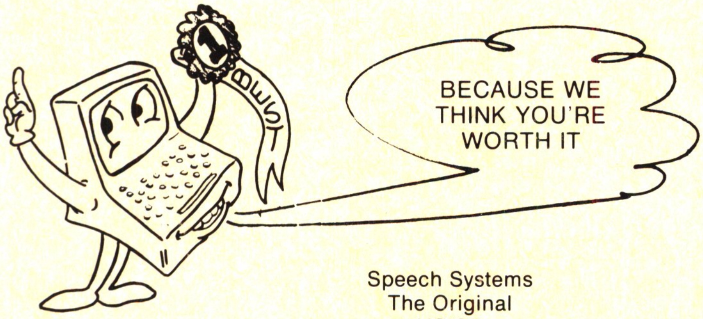
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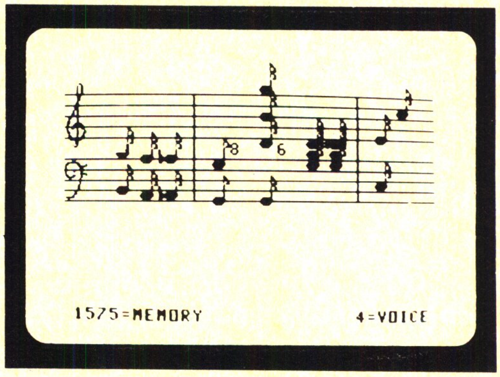

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```
6000 REM * BARS *
6010 COLOR 2,1
6020 LINE(94,147)-(102,92),PSET,
BF
6030 COLOR 3,1
6040 LINE(124,147)-(132,72),PSET
,BF
6050 COLOR 4,1
6060 LINE(158,147)-(166,83),PSET
,BF
6070 COLOR 2,1
6080 LINE(188,147)-(196,80),PSET
,BF
6090 COLOR 3,1
6100 LINE(218,147)-(226,102),PSE
T,BF
6110 RETURN
```

```
TO BARS
  SX 94   SY 42   SH 0
  PC 1   MAKE :F 52   RPT
  SX 125   SY 42
  PC 2   MAKE :F 76   RPT
  SX 156   SY 42
  PC 3   MAKE :F 66   RPT
  SX 190   SY 42
  PC 1   MAKE :F 70   RPT
  SX 220   SY 42
  PC 2   MAKE :F 50   RPT
END

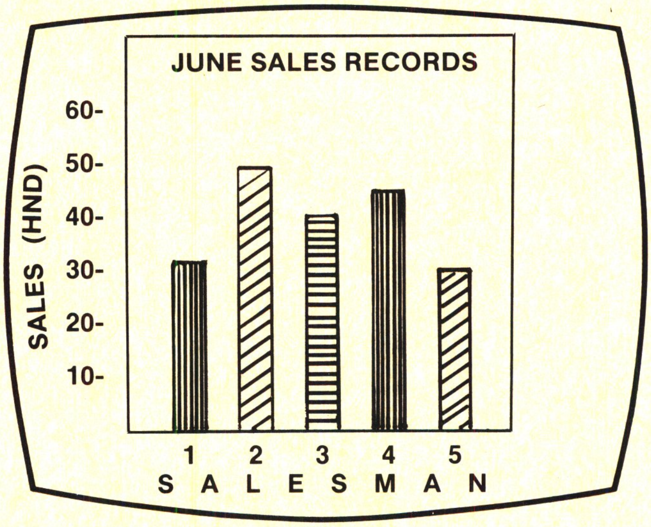
TO RPT
  REPEAT 6(FD :F   RT 90
    FD 1   RT 90   FD :F
    LT 90   FD 1   LT 90)
  FD :F
END
```

A summary of LOGO abbreviations used:

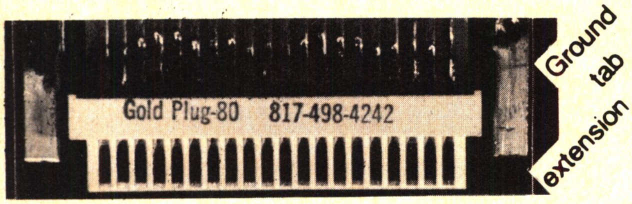
HT = HIDE TURTLE
SX = SET X (coordinate of turtle)
SY = SET Y (coordinate of turtle)
FD = FORWARD (move)
RT = RIGHT (turn)
SH = SET HEADING (of turtle)
PC = PEN COLOR
LT = LEFT (turn)
:F = a variable
RPT = a subprocedure called by BARS

NOTE: The heading must be set to 90 for *PRINT* commands in LOGO in order to print from left to right. (See the BOTTOM procedure)

The Graph



▥ color 1
▨ color 2
☰ color 3



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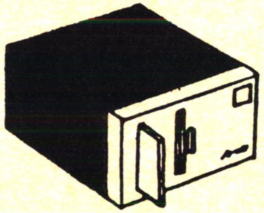

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BITS AND BYTES OF BASIC

Variables Revisited

By Richard White
RAINBOW Contributing Editor

Well, another Anniversary Issue is here and we stop to think how far we have come and maybe where the future may lead. Back when Lonnie Falk started THE RAINBOW we were all quite new at computing and any sources of information or programs were viewed with delight. Reading articles on how to program in BASIC on the Model I helped, but there were things in CoCo BASIC that no one else had and things that CoCo BASIC did not have. Study the manuals and experiment was the usual course.

Maybe life is somewhat easier for newcomers now. Perhaps there is too much information for one to digest, and much of it is too technical for the beginner. So, let's take one of our occasional trips back to basics and look at variables in detail to bring our new programmers on board.

In a high level language like BASIC, variables reference and organize the data used in the program. A variable is simply a name given to a piece of data. Think of data being assigned to a variable and not of the variable equalling the data. Early versions of BASIC sought to reinforce the assignment idea by making one write *LET X=10* rather than *X=10*. *LET* is in Extended Color BASIC but is virtually never used.

Color BASIC supports two types of variables — string, which holds a string of characters, and real or numeric. BASIC constructs variable tables to keep data about active variables and an analysis of the variable table will help you understand how variables work. The variable table starts at the end of your BASIC program and extends upward into memory. The first table entries are real variables, each occupying seven bytes. The first two bytes for each entry are the ASCII values of the first two letters in the variable name. Note that Extended BASIC lets you use variable names longer than two letters, but only the first two are used in the variable table and hence have any meaning. The following five bytes carry the value of the variable in a form readable by BASIC's floating point decimal routines. The CoCo is much more adept at reading these bytes than I am, so let's let it do its thing and not try to guess what it is doing.

However, it might prove interesting to look at the variable table entries. Following is a short program that does just that.

```
5 A=0:B=0:AB$=“100”:AB=10000
10 B=VARPTR(AB):FORA=B-2 TO B+4
:PRINTPEEK(A);CHR$(PEEK(A));:NEXT
```

In Line 10, *VARPTR(AB)* returns the address of the first data byte associated with variable AB. When the program is run, the following is printed on the screen.

```
65 A 66 B 142   64 @ 28   0   0
```

There will be a graphics character after 142 which I have omitted and will omit when they occur later. The ASCII codes for A and B show up and then three numbers which are all that BASIC needs to store 10000. If you change the value assigned to AB in Line 5 and rerun the program, you can see how the stored values change. Here are some samples to get you started:

```
5 A=0:B=0:AB$=“100”:AB=100000
65 A 66 B 145   67 C 80 P 0   0
```

(Richard White has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the author of the TIMS data base management program.)

```
5 A=0:B=0:AB$=“100”:AB=123456000000
65 A 66 B 165   101 e 244   104 h 128
5 A=0:B=0:AB$=“100”:AB=2E37
65 A 66 B 252   112 p 189   194   30
```

Strings are stored from the top of RAM down within the string space you define with *CLEAR*. *CLEAR 1000* will reserve 1000 bytes for string storage. Each string is listed in the variable table. We can change our program to look at the table entry for string AB$ by listing that variable in the brackets after *VARPTR*.

```
5 A=0:B=0:AB$=“100”:AB=10000
10 B=VARPTR(AB$):FORA=B-2 TO B+4
:PRINTPEEK(A);CHR$(PEEK(A));:NEXT
```

When we *RUN* the program, we get the following on the screen. Again, any graphics characters printed are not shown below.

```
65 A 194   3   0   38 & 18   0
```

The 65 for A is there but not 66 for B. Instead, we see 194, which is the ASCII value for B plus 128. This flags BASIC that the listing is for a string-type variable. Next is a three, which is the number of characters — our string was 100. The second byte is not used and is set to zero. The third and fourth bytes are the high and low bytes of the address of the beginning of the string. The fifth byte is not used and is set to 0. This is all BASIC needs to find the string and read it.

If we had another line like *15 AB$=“NEW DATA”*, BASIC would write *NEW DATA* to an unused part of the string space and put the new length and address data under the AB$ listing in the variable table. The old AB$ string is still in the string space, but reference to it in the variable table is gone. After a while, new string entries will fill up string space, even though it contains some “lost” strings. At that point, CoCo stops to “collect the garbage.” Strings listed in the variable table are rewritten over unlisted space moving the free space to the end of string space. This may take a few seconds during which the computer seems to go dead, but it is only cleaning house.

Let's come back for a moment to variable names. In Color BASIC you may use any one- or two-letter combination for a variable except reserved words. What is a reserved word? It is one that is also a BASIC statement or function command. *ON*, *TO*, *GO* and *FN* are examples. When the computer encounters an *ON*, it starts looking for a variable representing a number to use in a following *GOSUB* or *GOTO* action. If your statement had been *ON=20*, no variable comes next, the computer gets confused and registers a complaint as a Syntax Error.

Extended Color BASIC allows you to use whole words as variables, but we now know how the variable table works and that only the first two letters are used. The objective is to allow writing clearer programs, but there are drawbacks that keep people from using the capability. First, there is the added memory used, one byte for each added letter each time the variable is used. Secondly, the number of reserved words (BASIC commands, remember?) become much more numerous. Last is the trouble in devising meaningful words which always are different from any other in the first two letters. If I had two *FOR TO NEXT* loops, one within the other, I might like to name the variable in the outer loop *COUNTONE* and the inner loop variable *COUNTTWO*. Since the first two letters are the same the computer cannot tell the difference and the loops won't work the way you expect. So, we will try *ONECOUNT* and *TWOCOUNT* instead. The first two letters are different, but *ONECOUNT* contains *ON*, a reserved word, and SN Error results. Another loser is *TWO-COUNT*. The computer sees it as *TW-CO* without a variable to assign the result or the equal sign — SN Error.

Real variables represent numbers, and are used directly in equations making calculations resulting in some number. Some BASIC dialects let you define whether a variable will be an integer, a single-precision, floating decimal number or a double-precision decimal number. The higher the precision, the more memory that is necessary to store the number. CoCo will accept positive or negative numbers up to 10 to the 37th power and will display nine significant digits. This is fine for nearly all programming you are likely to do. I miss the ability to define integer variables and benefit from the memory saving the results. Simple counting and other integer number operations are encountered all the time. Where a wealth of integer data is to be used, it can be put into strings and recovered using methods we have discussed in previous columns and will discuss in the future.

> *“Real variables represent numbers, and are used directly in equations making calculations resulting in some number. Some BASIC dialects let you define whether a variable will be an integer, a single-precision, floating decimal number or a double-precision decimal number.”*

A string variable references a string of characters. In the assignment statement for a string variable, characters must be between quotes or defined using *CHR$(XX)* or *STR$(Y)*. Here XX is the ASCII number for the character. Y is a real variable that is converted to a string having a leading space. Examples are *A$ = “ THIS IS AN example”*, *B$= CHR$(191)*, which is a solid red block and *N$ = STR$(20)*.

Strings can be added to each other in a process called concatonation. *C$ = A$ + “ FOR THE ARTICLE ON VARIABLES”*. Now C$ represents *“THIS IS AN example FOR THE ARTICLE ON VARIABLES”*. If we concatonate C$ with B$ like this *D$ = C$ + B$* we would get the same string as before but with a red block after the period. Enter this program and run it.

```
10 A$ = “CHARACTERS”
20 FOR X=1 TO 10 : A$ = A$ + CHR$(8) : NEXT
30 PRINT A$
```

We know there are characters in A$, but they don't print. The trick is that *CHR$(8)* is the backspace or left arrow character. As soon as *"CHARACTERS"* was printed, 10 backspaces were printed which erased *"CHARACTERS."* This may not be good for much, but it does give food for thought. There is a watch-out here in that you can add non printing characters to strings that give unexpected results. Also note the *A$ = A$ + CHR$(8)*. A$ appears on both sides of the equality. We can also write *A = A + 10*. This comes back to the assignment idea. The right side is evaluated and the result is assigned to the variable on the left. The computer finishes its work on the right portion using whatever A or A$ represent initially before it redefines them.

Both real and string variables can be viewed as either global or local. Actually BASIC variables are always global since they can be used anywhere in a BASIC program. In languages like PASCAL, C and BASIC09, variables have a value only in the particular subroutines or procedures where they are declared. Further, the variable X in one procedure is a different variable from the variable X in a different procedure. We cannot define our variables like this in BASIC, but we can view how we use them as local or global.

> *"Actually BASIC variables are always global since they can be used anywhere in a BASIC program. In languages like PASCAL, C and BASIC09, variables have a value only in the particular subroutines or procedures where they are declared."*

In a file program, the variables that refer to the data records are used as global in that they are defined in the input section, changed in the editor saved in another section to tape or disk, used in search and sort sections and in various subroutines. A variable used in a *FOR-TO-NEXT* loop in a subroutine means nothing when you exit that subroutine and may be re-used elsewhere.

There is a savings of memory if certain variable names are prechosen and used only for local purposes. They can be redefined and used again and again in other parts of the program. This serves to help clarify the program if it is known that J and K are always used locally, generally serve counting purposes and never have meaning once the using routine is left. This will work well with some careful discipline and I think is much better than trying to find an unused variable each time a short loop is needed. You should also define string variables and other real variables for local temporary data holding purposes. Just make sure all local variables are defined when they are first used in the routine and do not contain data needed elsewhere when the routine is exited.

Numbers and strings may also be kept in subscripted or array variables. Here one array name is used to refer to a series of data items. For example *A(1)=23, A(2)=45 . . . A(20)=14*. BASIC then sets up a separate portion of the variable table above regular variables in memory for array variable entries. An array variable table for *A$(10)* looks like the following.

-7	ARRAY	65
-6	NAME	128
-5	DISPLACEMENT	VX
-4	TO NEXT ARRAY	YZ
-3	# OF DIMENSIONS	1
-2	NUMBER OF	00
-1	ENTRIES	11
VARPTR(A$(0)) >	A$(0) LENGTH	
		0
	A$(0)	
	ADDRESS	
		0
VARPTR(A$(1)) >	A$(1) LENGTH	
		0
	A$(1)	
	ADDRESS	
		0
	·	
	·	
	·	
VARPTR(A$(10)) >	A$(10) LENGTH	
		0
	A$(10)	
	ADDRESS	
		0

The array for A(N) is similar except the value for each member of the array is in each five-byte block. When a subscripted variable is first used, an eleven entry block is established in the variable table for that variable. Note that A$(0) is a member of the array. If you need more entries, you must dimension the variable, e.g., *DIM A$(100)* or *DIM A$(X)*. You can also have multi-dimensioned arrays in Extended BASIC. A$ could be dimensioned *DIM A$(50,10)*. Note that such arrays use memory space. A$(50,10) requires 7 + 50*5*10 or 2507 bytes of memory for the variable table alone. Finally, if you know you are only going to use a few members of an array, say four or five, then dimension the array, say *DIM A$(5)* to keep memory use to only what you really need.

Arrays are most useful where the program itself must choose which data item to use. You are permitted and even encouraged to use a variable within the parentheses (A$(X)) so that a number determined by the program selects the desired array member. Some good examples of array usage have appeared in recent issues of THE RAINBOW.

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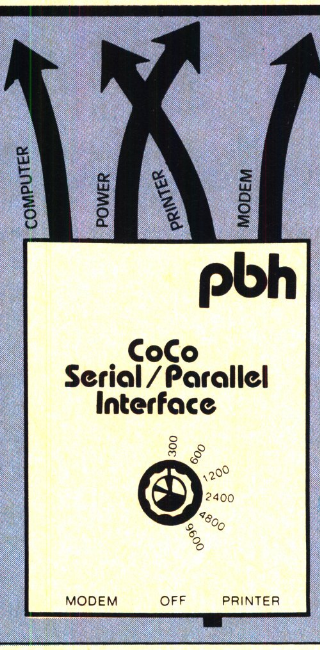

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THE CAVERNS OF DEATH

By Bill Franks

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One day while flying around, you unwittingly flew into these caves. At first it was easy, with plenty of room to fly between the stalactites and stalagmites and eat the plentiful bugs. As you went deeper, however, there became less and less room.

You must fly carefully to stay alive. How long will you last? Will you find another exit or will you perish like the others before you? Only time can tell!

The object of *Bats And Bugs* is to accumulate as many points as possible before the caves take their toll. Points are obtained by eating the bugs flying toward you. For each red or blue bug you devour, you will receive 50 points. Avoid the yellow bug — it's poisonous and will kill you if you eat it! Many times the yellow bug will be in your passageway or will jump in front of you, making death inevitable. Every time you gain a multiple of 400 points, you will increase a skill level to a harder cave. After completing level eight, each level thereafter will be of the same difficulty.

There will be times (particularly in the higher levels) when the caves look nearly impossible to navigate. However, there are *no* impossible caves. In this type of cave, you can let your back hit the protrusions just enough to knock off their points. Hitting the stalactites or stalagmites with your front always causes death, but if you aim your course correctly, your back can hit them safely.

You have three lives. Each time you die, a new cave of the same level is drawn. Before you begin each cave, your bat will be moving down the screen. When he gets to the height where you want to start flying, press any key or the fire button to begin play. To reset the game at the end, also press any key or the fire button.

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Finally, if you don't feel like typing in the game and would like a copy on tape, send me $4 and I will galdly send you a copy. My address is 4939 Tunlaw St., Alexandria, VA 22312.

(Bill Franks is a self-taught programmer who has owned a CoCo for two years. When he isn't programming, he attends Thomas Jefferson High School in Alexandria, Va., where he is a member of both the varsity track and soccer teams.)

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Program Description

Line 0 sets up the arrays.
Line 1 puts the computer in the graphics mode.
Line 2 draws and gets the bat.
Lines 3 and 4 draw the cave.
Lines 5 and 6 draw, get the bugs and pick starting places.
Line 8 moves the bat down screen at start of each cave.
Lines 10 to 20 are the main loop moving you and bugs after making sure you haven't gone off board or died.
Lines 23 to 56 are subroutines used by the main loop.
Lines 100 to 107 are the death routine.
Lines 200 to 219 are the score drawing routine.
Lines 220 and 221 are the completed level routine.
Lines 300 to 302 get the level and way of movement you wish to start with.
Lines 400 to 410 draw the title page.

6	117
18	244
104	163
216	224
END	222

The listing:

```
0 POKE65495,0:DIMA(1),B(1),C(1),
D(1),E(1):A$="T255V30O5CDEFGAB":
GOSUB400
1 GOSUB300:PMODE1,1:PCLS:SCREEN1
,0:PMODE1,3:PCLS:SCREEN1,0
2 DRAW"BM101,100C3E4F4E4F4BM120,
100F4E4F4E4":GET(100,101)-(117,0
95),A,G:GET(120,100)-(137,106),B
,G:GOSUB5:PCLS:GOSUB3:GOTO7
3 FORI=0TO220STEP20:H=RND(3)+1:C
OLORH,1
4 SOUNDRND(255),1:F=RND(LE)+5:G=
190-((LE+5)-F)-5:F=F+15:LINE(I,1
5)-(I+10,F),PSET:LINE(I,15)-(I+2
0,15),PSET:LINE(I+10,F)-(I+20,15
),PSET:LINE(I,190)-(I+10,G),PSET
:LINE(I+10,G)-(I+20,190),PSET:PA
INT(I+5,17),H,H:PAINT(I+5,189),H
,H:NEXT:A=10:B=100:RETURN
5 PCLS:COLOR2,1:LINE(100,100)-(1
03,103),PSET,BF:GET(100,100)-(10
7,103),C,G:COLOR3,1:LINE(120,100
)-(123,103),PSET,BF:GET(120,100)
-(127,103),D,G:COLOR4,1:LINE(130
,100)-(133,103),PSET,BF:GET(130,
100)-(137,103),E,G
6 M1=RND(50)+200::M2=RND(70)+60:
M3=RND(100)+50:M4=RND(70)+60:M5=
RND(50)+100:M6=RND(70)+60:RETURN
7 GOSUB9:PCOPY3TO1:PCOPY4TO2
8 COLOR1,1:FORB=50TO150STEP5:GOS
UB41:FORI=1TO50:NEXT:LINE(A,B-6)
-(A+17,B),PSET,BF:P=PEEK(65280):
I$=INKEY$:IFI$<>""ORP=126ORP=254
```

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```
THEN10ELSENEXT:LINE(A,B-5)-(A+17
,B+7),PSET,BF:GOTO8
9 DRAW"BM210,0C3R10D14L10U14":LI
=3:SC=0::GOSUB200:PMODE1,3:DRAW"
BM10,10C3E4F4E4F4BM35,10E4F4E4F4
BM60,10E4F4E4F4":COLOR1,1:PMODE1
,1:SCREEN1,0:RETURN
10 IFKE=1THENP=PEEK(345)ELSEJ=JO
YSTK(0):K=JOYSTK(1):IFK<33THENP=
247ELSEP=1
11 IFP=247THENA=A+5:B=B-5:PU=1
12 IFP<>247THENA=A+5:B=B+5:PU=2
13 GOSUB23:IFA>230THENCOLOR1,1:L
INE(A-5,B-6)-(A+17,B+12),PSET,BF
:A=10:GOTO15ELSEGOTO15
14 IFPPOINT(A+8,B-4)<>1ORPPOINT(
A+8,B+8)<>1ORPPOINT(A+20,B-2)<>1
ORPPOINT(A+20,B+8)<>1ORPPOINT(A+
2,B-4)<>1ORPPOINT(A+2,B+8)<>1THE
NGOTO100ELSERETURN
15 M1=M1-15:M3=M3-15:M5=M5-15:IF
M1<5THEN50ELSEIFM3<5THEN51ELSEIF
M5<5THEN52
16 COLOR1,1:LINE(A-5,B-6)-(A+15,
B+12),PSET,BF:ONPU GOSUB40,41:PC
OPY3TO1:PCOPY4TO2:PMODE1,1:GOSUB
39
17 IFA>M1-17ANDA<M1+4ANDB>M2-6AN
DB<M2+5THENPLAYA$:GOTO100ELSEIFA
>M3-17ANDA<M3+4ANDB>M4-6ANDB<M4+
5THENPLAYA$:GOTO55ELSEIFA>M5-17A
NDA<M5+4ANDB>M6-6ANDB<M6+5THENPL
AYA$:GOTO56
18 PMODE1,3
19 GOSUB14
20 GOTO10
23 IFB<12THEN100ELSEIFB>180THENB
=180:GOTO100ELSERETURN
37 IFM1<0THENM1=0ELSEIFM3<0THENM
3=0ELSEIFM5<0THENM5=0
38 RETURN
39 GOSUB37:PUT(M1,M2)-(M1+7,M2+3
),C,PSET:PUT(M3,M4)-(M3+7,M4+3),
D,PSET:PUT(M5,M6)-(M5+7,M6+3),E,
PSET:RETURN
40 PUT(A,B)-(A+17,B+6),A,PSET:RE
TURN
41 PUT(A,B)-(A+17,B+6),B,PSET:RE
TURN
50 M1=240:M2=RND(70)+60:GOTO16
51 M3=240:M4=RND(70)+60:GOTO16
52 M5=240:M6=RND(70)+60:GOTO16
55 SC=SC+50:GOSUB200:GOTO51
56 SC=SC+50:GOSUB200:GOTO52
100 PMODE1,1:PLAY"O1V30T7CFCFCFC
FCFCFCF":IFB<12THENB=12
```

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```
101 COLOR1,1:SO=(180-B)/3+5:FORI
=B TO180STEP10
102 B=I:GOSUB41:LINE(A,B-11)-(A+
17,B-3),PSET,BF:FORJ=1TO3 :SO=SO
-1:SOUNDSO,1:NEXT:NEXT
103 PMODE1,3:COLOR1,1:LI=LI-1:LI
NE(10+(LI*25),0)-(26+(LI*25),10)
,PSET,BF:IFLI=0THEN105
104 GOTO221
105 PMODE1,1:SCREEN1,1:COLOR1,1:
LINE(10,0)-(28,10),PSET,BF
106 FORI=1TO500:NEXT:I$=INKEY$
107 P=PEEK(65280):I$=INKEY$:IFI$
<>""ORP=126ORP=254THEN1ELSE107
200 PMODE1,3:SC$=STR$(SC):IFSC>9
9950THENSC=0000:GOTO200
201 IFLEN(SC$)<6THENSC$="0"+SC$:
GOTO201
202 B1=VAL(MID$(SC$,3,1))::B2=VA
L(MID$(SC$,4,1)):B3=VAL(MID$(SC$
,5,1)):B5=VAL(MID$(SC$,2,1))
203 COLOR1,1:LINE(90,0)-(230,15)
,PSET,BF:COLOR3,1:DRAW"BM210,0R1
0D14L10U14":DRAW"BM120,0":B4=B1:
GOSUB206:DRAW"BM150,0":B4=B2:GOS
UB206:DRAW"BM180,0":B4=B3:GOSUB2
06:DRAW"BM90,0":B4=B5:GOSUB206:I
FSC/400=INT(SC/400)ANDSC>0THEN22
0ELSEPMODE1,1:RETURN
206 ONB4+1 GOSUB210,211,212,213,
214,215,216,217,218,219:RETURN
210 DRAW"R10D15L10U15":RETURN
211 DRAW"D15":RETURN
212 DRAW"R10D7L10D7R10":RETURN
213 DRAW"R10D7L10R10D7L10":RETUR
N
214 DRAW"D7R10U7D14":RETURN
215 DRAW"R10L10D7R10D7L10":RETUR
N
216 DRAW"R10L10D14R10U7L10":RETU
RN
217 DRAW"R10M-10,+14":RETURN
218 DRAW"D14R10U14L10D7R10":RETU
RN
219 DRAW"R10D7L10U7D7R10D7L10":R
ETURN
220 SCREEN1,0:FORI=1TO15:PLAY"T2
55V30O4CDEFGAB":NEXT::LE=LE+5:IF
LE>85THENLE=85
221 COLOR1,1:LINE(0,16)-(256,191
),PSET,BF:PMODE1,3:SCREEN1,0::GO
SUB3:A=10:B=100:PMODE1,1:PCOPY3T
O1:PCOPY4TO2:SCREEN1,0:I$=INKEY$
::GOTO8
300 CLSRND(8):PRINT@226,"ON WHAT
 LEVEL DO YOU WANT";:PRINT@261,"
TO START?(1-8)";:INPUTLE::IFLE>8
ORLE<1THEN300ELSELE=45+(5*LE)
301 CLSRND(8):PRINT@256,"JOYSTIC
K OR SPACEBAR?(J OR S)";:INPUTKE
$:IFKE$="J"THENKE=2ELSEIFKE$="S"
THENKE=1ELSE301
302 RETURN
400 GOSUB420:LE=75:PMODE1,1:PCLS
:SCREEN1,0:GOSUB3
401 DRAW"BM160,90C3D20R15U10L15R
10U10L10BM180,90D20R15U20BM200,9
0R15L15D20R15U10L5BM220,90R15L15
D10R15D10L15"
402 DRAW"BM105,100R5BM115,90D20U
20F20U20BM140,100R6"
403 DRAW"BM10,90D20R15U10L15R10U
10L10BM30,90D20U10R15D10U20L15BM
50,90R16L8D20BM70,90R15L15D10R15
D10L15"
410 FORI=1TO3000:NEXT:RETURN
420 CLS:PRINT@104,"BATS -N- BUGS
"
421 PRINT@172,"BY"
422 PRINT@232,"BILL FRANKS"
423 PRINT@296,"4939 TUNLAW ST."
424 PRINT@360,"ALEXANDRIA,VA."
425 PRINT@424,"22312"
426 FORI=1TO2000:NEXT:RETURN
```

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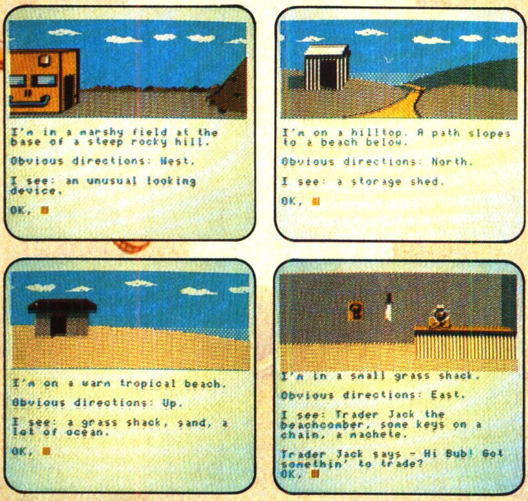


```
I'm in a marshy field at the
base of a steep rocky hill.

Obvious directions: West.

I see: an unusual looking
device.

OK,
```

```
I'm on a hilltop. A path slopes
to a beach below.

Obvious directions: North.

I see: a storage shed.

OK,
```

```
I'm on a warm tropical beach.

Obvious directions: Up.

I see: a grass shack, sand, a
lot of ocean.

OK,
```

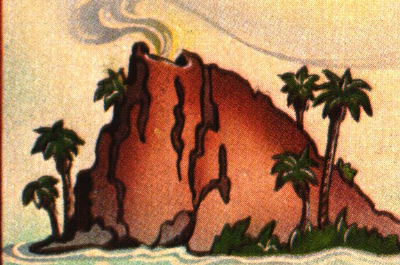
```
I'm in a small grass shack.

Obvious directions: East.

I see: Trader Jack the
beachcomber, some keys on a
chain, a machete.

Trader Jack says - Hi Bub! Got
somethin' to trade?
OK,
```

Actual photographs taken from Calixto Island screen.



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Interface Your Own Circuits

By T. Whit Athey

While the majority of Color Computer owners are probably making their peace with at least some aspects of programming, not too many are all that comfortable with the guts of the gadget — the hardware, the digital circuitry. However, for anyone who has been secretly wishing that he/she knew a lot more about digital circuits and the operation of the Color Computer, I want to convince you that now is the time to learn. While it isn't exactly easy to understand digital circuits, it isn't any more difficult than programming, and in fact, is very similar to programming in many ways. Besides, it's great fun.

In this article I would like to entice you into building an I/O board which can interface between the Color Computer and your own projects. By taking the plunge and "getting your feet wet" with a real hardware project, you can learn much more than by just reading about it. Also, this is a very practical way to begin because the project is straightforward and leads naturally to further work on your own. I will also discuss some of the possible applications of the board.

I should begin by giving a large measure of credit for my interest in circuits to William Barden. His article, "A General-Purpose I/O Board for the Color Computer,"[1] appeared in the June 1982 issue of *Byte Magazine*. He has an excellent discussion on the way the Color Computer does I/O, both internally (to and from memory) and externally (to and from peripherals), and I would recommend that you look it up. The only problem is that Mr. Barden's design for an I/O board doesn't work on all Color Computers.

The Cartridge Connector

First of all, I am sure that everyone knows that the Color Computer has a slot on the right side where the game cartridges plug in. If you have a game cartridge lying around, turn it over and slide back the spring-loaded cover from the business end of it. Inside you can see the end of a printed circuit (PC) board and an edge connector with 40 pins (20 on top, 20 on bottom). So, there's nothing more inside that little black box than a PC board with assorted components (components not visible without taking the cartridge completely apart).

Figure 1 shows the computer's cartridge connector and the mating PC board connector. Those 40 lines give us access to nearly every signal of importance which is gener-

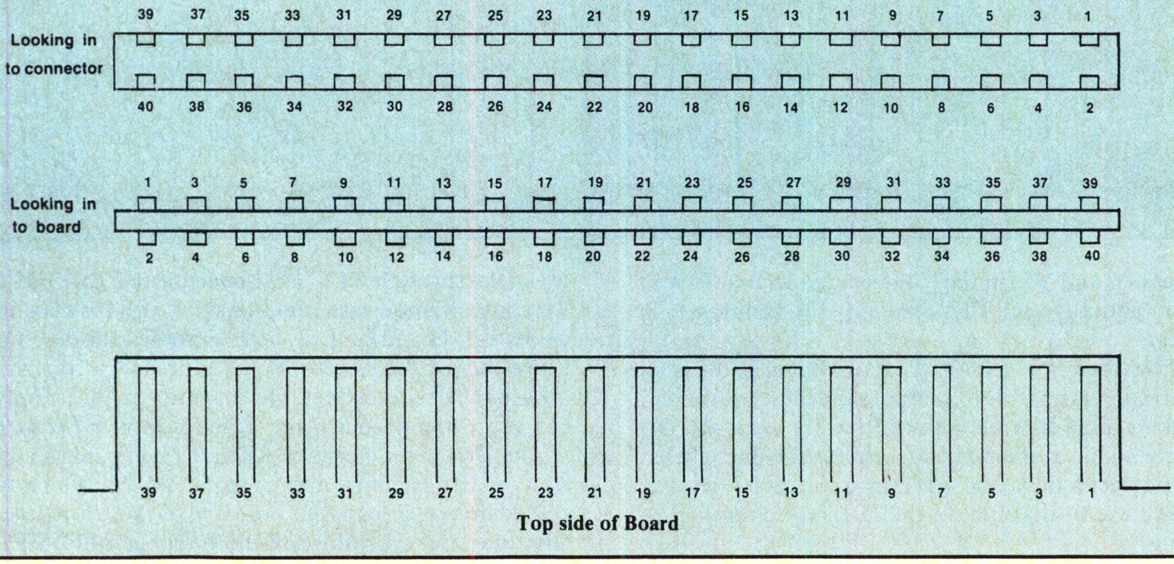
Table 1
Cartridge Connector Signals

Pin No.	Signal Name	Description
1	-12 V	-12 volts (100 mA)
2	+12 V	+12 volts (300 mA)
3	HALT	Halt input to the CPU
4	NMI	Non-maskable interrupt
5	RESET	Reset and power-up signal
6	E	Main CPU clock signal
7	Q	Clock Signal which leads E
8	CART	Interrupt for cartridge detect
9	+5 V	+5 volts (300 mA)
10	D0	CPU bit 0
11	D1	CPU bit 1
12	D2	CPU bit 2
13	D3	CPU bit 3
14	D4	CPU bit 4
15	D5	CPU bit 5
16	D6	CPU bit 6
17	D7	CPU bit 7
18	R/W	Read/write signal from CPU
19	A0	CPU Address bit 0
20	A1	CPU Address bit 1
21	A2	CPU Address bit 2
22	A3	CPU Address bit 3
23	A4	CPU Address bit 4
24	A5	CPU Address bit 5
25	A6	CPU Address bit 6
26	A7	CPU Address bit 7
27	A8	CPU Address bit 8
28	A9	CPU Address bit 9
29	A10	CPU Address bit 10
30	A11	CPU Address bit 11
31	A12	CPU Address bit 12
32	CTS	Cartridge select signal
33	GND	Ground
34	GND	Ground
35	SND	Sound input
36	SCS	Spare select signal
37	A13	CPU Address bit 13
38	A14	CPU Address bit 14
39	A15	CPU Address bit 15
40	SLENB	Disable device selection

(Whit Athey is a physicist with the federal government at Rockville, Md.)

To The Color Computer

Figure 1 Cartridge-connector pins



Top side of Board

ated inside the Color Computer. Anyone who has a little soldering experience can put together his/her own PC board (with or without a cover) which plugs into the cartridge slot and interacts with the computer. The board design that I will discuss can provide the first stage, the interface, for your own designs, or for some examples I will present.

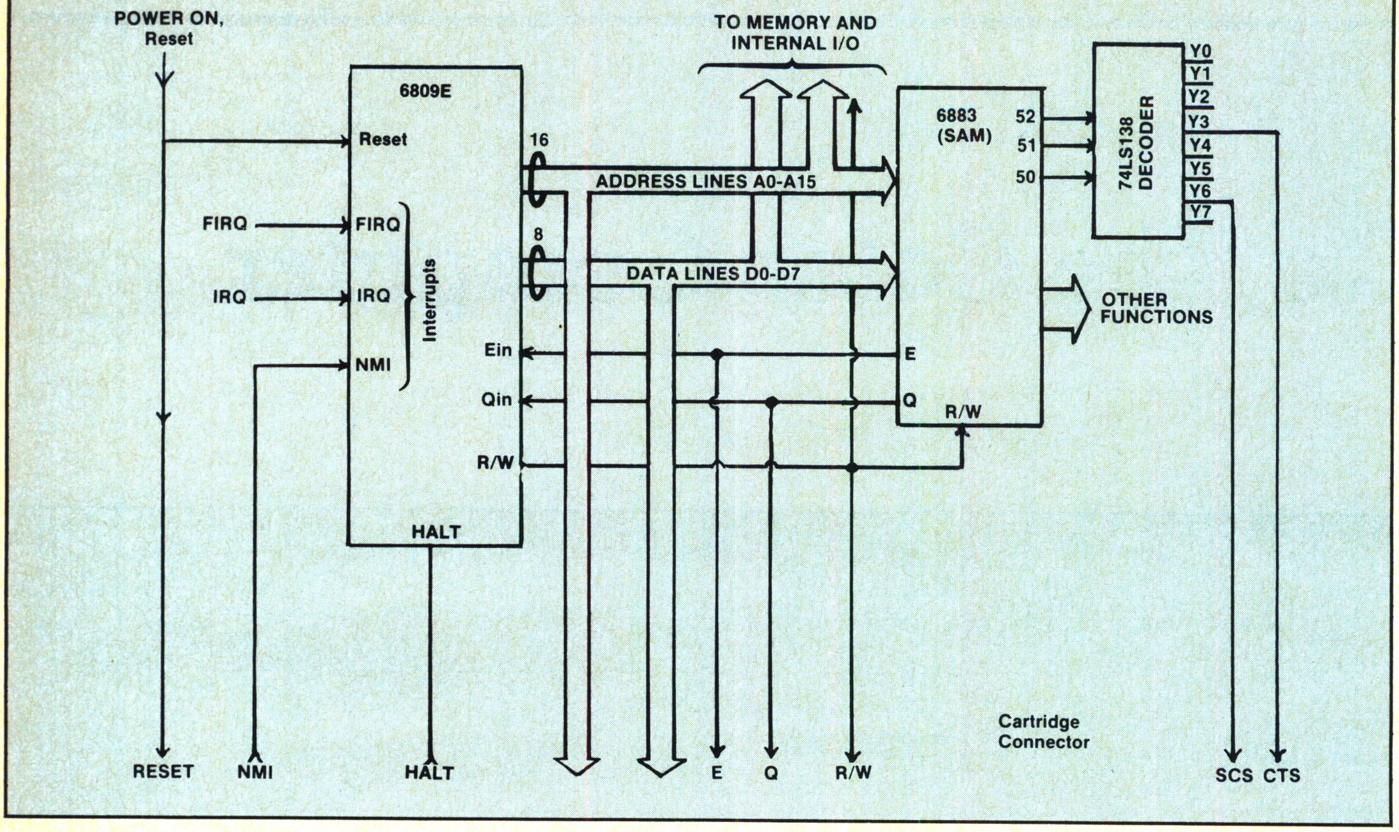
The Color Computer's I/O Structure

Figure 2 shows the block diagram of the Color Computer I/O and the lines which come out to the cartridge slot. Table 1 lists these lines with their names and functions. Many of the lines are connected directly to the heart of the computer, the Motorola 6809E microprocessor. Also of fundamental importance is the Motorola 6883 synchronous address multiplexer (SAM). In fact, the Color Computer is made up almost entirely of Motorola integrated circuits ("chips").

The 6809E is the real brains of the outfit, controlling the whole operation, but it farms out many important tasks to other large scale chips like the SAM. The 6809E is mostly an 8-bit microprocessor, but with some 16-bit capability, and it is probably the most powerful 8-bit microprocessor around. There are 16 address lines designated A0 (least significant bit) to A15 (most significant bit) which allow unique addressing of up to $2^{16} = 65536$ ("64K") memory locations. The address lines are used whenever the 6809E fetches a byte (8 bits) of data or an operation code from memory, or writes a byte to memory or to other internal devices. The data is transmitted over eight data lines designated D0-D7.

The SAM chip handles several routine functions for the 6809E. It provides two clock signals (just an oscillating square-wave signal), called E and Q to the microprocessor to permit all operations to have the proper timing. The SAM also controls and decodes the memory mapping of the system. The computer must know not only the exact address in an operation, but also what *area* of memory is being addressed. Since some memory areas are dedicated to specific tasks, the SAM feeds three signals to a 74LS134 decoder chip which, in turn, provides an output which depends on the area of memory being addressed. Only one of the eight output lines of the 74LS134 are active (low, or zero voltage) at any one time. When addresses in the range 0-7FFF are being addressed, Y0 will be active, indicating RAM (random access memory) addresses. Y1 and Y2 indicate that the ROM (read only memory) areas at 8000-9FFF or A000-BFFF are being addressed, and Y3 points to cartridge ROM at C000-DFFF. When Y4 is active the PIA (peripheral interface adaptor) addresses at FF00-FF1F are

Figure 2 — Color Computer I/O Block Diagram


POWER ON, Reset
6809E
Reset
FIRQ
FIRQ
IRQ
IRQ
NMI
Interrupts
Ein
Qin
R/W
HALT
16
8
ADDRESS LINES A0-A15
DATA LINES D0-D7
TO MEMORY AND INTERNAL I/O
6883 (SAM)
52
51
50
E
Q
R/W
74LS138 DECODER
Y0
Y1
Y2
Y3
Y4
Y5
Y6
Y7
OTHER FUNCTIONS
Cartridge Connector
RESET
NMI
HALT
E
Q
R/W
SCS
CTS

being addressed, and Y5 similarly selects the second PIA at FF20-FF3F (actually each PIA uses only four addresses in these ranges).

If Y6 is low, locations FF40-FF5F are being addressed. There is nothing in the Color Computer at these addresses, but Y6 could be used to select a third PIA, for example. Or, since Y6 is available at the cartridge slot (as the line labeled SCS), it can select a device plugged into the cartridge slot. We will make use of that fact in the interface circuit to be outlined here.

Note that when the microprocessor calls for a memory location, it can only put out the address on the address lines (to which the SAM/74LS134 adds the map signal, Yn) and "listen" for a response. It does not "know" what device is actually responding. It is only important that the device recognize that it is being addressed, and become active only when it is being addressed.

A more detailed discussion of the workings of the Color Computer is given in the *Color Computer Technical Reference Manual,*[2] available at Radio Shack.

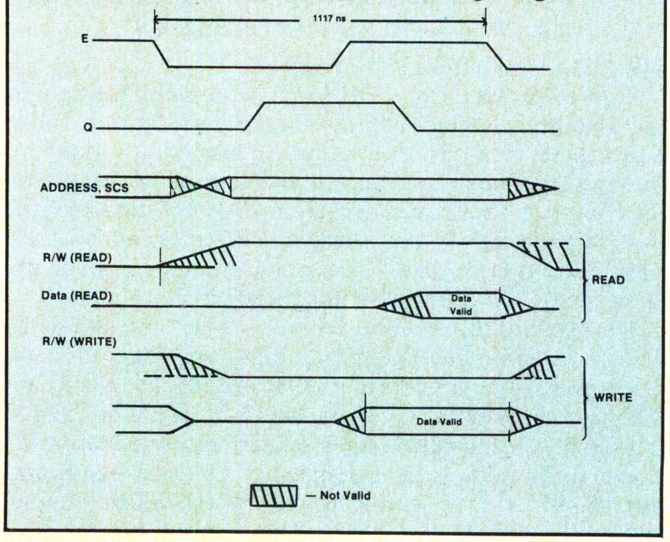
I/O Operations

Input/output operations in the Color Computer are said to be "memory mapped," which means that the microprocessor is tricked into thinking that I/O devices or peripheral controllers are just another part of memory. All that is required to carry out I/O operations is the execution of an instruction like LDA (6809 operation to load the A register) or STA (store contents of A register) to the address of the device. This can even be done from BASIC with *PEEK* or *POKE* commands.

In the Color Computer, locations FF00-FF3F are used for I/O through the peripheral interface adaptors (PIAs). For example, FF00-FF03 are used to read the keyboard and joysticks through PIA U8. Locations FF20-FF23 are used for controlling several functions through PIA U4, including cassette I/O, serial I/O, and graphics modes. One must know the proper byte to write to these locations in order to obtain the desired effect, but the bottom line is that the byte can get to the proper place from a simple STA or *POKE*.

The PIA can determine when it's being addressed by the state of the memory map signals, Y0-Y6, which were discussed above. Recall that only one of these is active (low) at any time, and that addresses in the range FF00-FF1F result in Y4 going low. Thus Y4 can be used as a "chip select" signal for the PIA U8, and similarly for Y5 for PIA U4. By using only two of the 16 address lines, namely A0 and A1, along

Figure 3 Color Computer Timing Diagram


1117 ns
E
Q
ADDRESS, SCS
R/W (READ)
Data (READ)
Data Valid
READ
R/W (WRITE)
Data Valid
WRITE
— Not Valid

with the chip select signal, the PIA U8 can distinguish its four addresses, FF00-FF03, and will only respond to addresses in this range. The fact that Y4 is low means that the 16 address lines carry the values 1111 1111 0000 00-- (FF0- in Hex), and only the last two lines, A0 and A1, need to be checked, and that is all that the PIA does check.

Figure 3 shows the timing for the read and write cycle of the 6809E. For example the LDA read cycle begins with the clock signal E going low. Within 100-200 ns (1 ns = 10^{-9} seconds) the R/W line has gone high (indicating read) and the address lines and Y0-Y6 have assumed their appropriate values. After E returns high the data lines will contain the byte being read and the 6809E "strobes" in the data.

The write cycle, for example during the execution of a STA instruction, proceeds in a similar fashion. In this case the R/W signal goes low to indicate a write. The data from the 6809E is put out on the data bus as E goes high and remains valid until the end of the E cycle. During this "data valid" period it may be "picked off" or "strobed in" by another device.

> *"With [modes 1 and 2] you can get . . . fancy . . . but here we will concentrate on the mode 0 I/O for which programming and interfacing is very easy."*

The I/O Interface Board

An interface board could be designed around another Motorola PIA chip which would insure compatibility with the rest of the Motorola system. However, the PIA is rather cumbersome to control (program), and it has only two 8-bit I/O ports. On the other hand, the analogous chip made by Intel, the 8255A PPI (programmable peripheral interface) chip is very easy to control, has three I/O ports and has more than enough flexibility for most applications. The only potential problem is that the Color Computer timing signals don't quite meet the specifications for the 8255A.

The Intel 8255A is a 40-pin large-scale integrated-circuit (LSI) chip. It has four 8-bit registers, three of which are bidirectional I/O ports, designated A, B, and C and the fourth is a control register which is used to set the operating mode of the chip's three ports under program control.

There are three modes under which the 8255A can be operated. The simplest mode, and the mode which will be discussed here, is mode 0, basic input and output. Mode 1 is for strobed input and strobed output, and mode 2 is for strobed bidirectional I/O. Modes 1 and 2 use lines from the C port as control lines for the other two I/O ports. With these last two modes you can get about as fancy as you like, but here we will concentrate on the mode 0 I/O for which programming and interfacing is very easy. Later, after building your interface and gaining experience with it, you can always use modes 1 and 2 with only software changes. These modes are discussed in detail in Paul Goldsbrough's book in the Blacksburg Continuing Education Series, *Microcomputer Interfacing with the 8255A PPI Chip*[3].

Under any of the modes the chip functions can be configured under program control by *POKEing* the proper byte into the control register (location FF43 in this design). Ports A, B and C can be either input or output ports, or any combination thereof. Port C can even be split into two 4-bit ports so that four lines are for input and four are for output. Table 2 shows the values for control words which select the various combinations.

Table 2
Control Words for 8255A Mode 0 Input/Output

Control Word (hexadecimal)	Port Function (I=input, 0=output)			
	Port A	Port B	C0-C3	C4-C7
80	0	0	0	0
81	0	0	I	0
82	0	I	0	0
83	0	I	I	0
88	0	0	0	I
89	0	0	I	I
8A	0	I	0	I
8B	0	I	I	I
90	I	0	0	0
91	I	0	I	0
92	I	I	0	0
93	I	I	I	0
98	I	0	0	I
99	I	0	I	I
9A	I	I	0	I
9B	I	I	I	I

The three I/O ports each consist of an internal 8-bit data register and eight I/O lines coming out to the pins of the chip. Whenever a port is programmed as an output, the contents of the internal data register will appear continuously on the I/O port pins (5 volts for ones and 0 volts for zeros) until the contents of the register are overwritten.

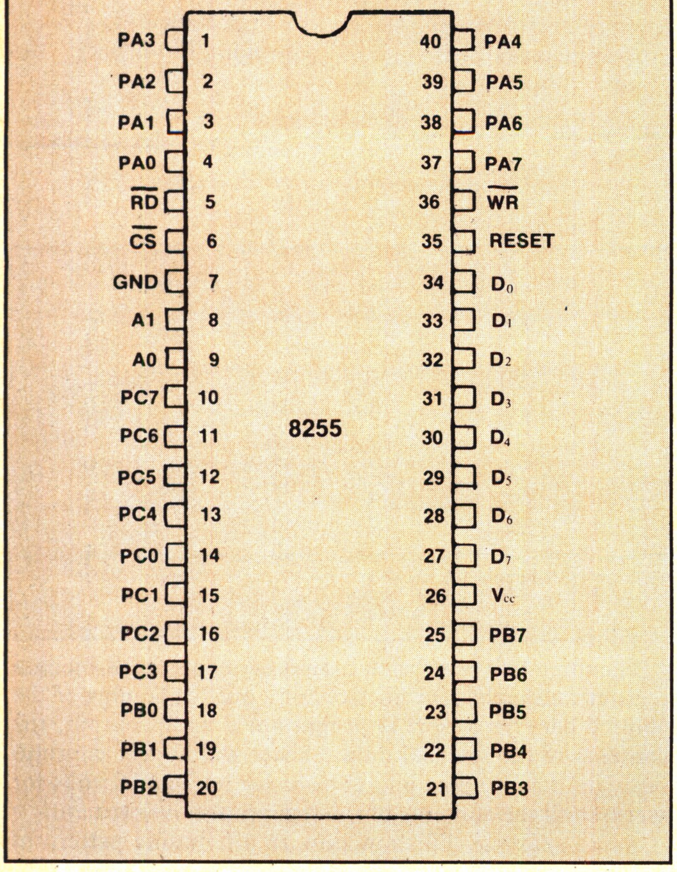
As an example, I'll show how an alternating pattern of ones and zeros can be written to the A register of the 8255A. The hexadecimal number AA has the bit pattern 10101010. From Table II we can set all the registers for output with the control word 80 (also in Hex). Assuming that we have completed the interface and have it plugged into the computer we would first set the control register with *POKE&HFF43 &H80* and then *POKE &HFF40,&HAA*. Then if we test the pins for port A (more on how to do that later), we should find the alternating pattern we wanted. The control register would only have to be set once at the beginning of a program.

There is only enough current capacity on these output pins to drive other integrated circuits. However, by feeding the lines through a line driver/buffer chip, small relays can be controlled. This will be discussed further in the section on applications.

Figure 4 shows the pin diagram of the 8255A. Most of the pins are I/O lines and have been discussed already. The function of the others is listed below:

CS (Chip Select)	A low on this input pin enables the chip. When the input is high the chip will not respond to any other signals.
RD (Read)	A low on this input enables the 8255A to put data on the data lines for the microprocessor to read.
WR (Write)	A low on this input pin enables the microprocessor to write data or a control word to the 8255A.
A0 and A1 (Address lines)	These input signals control the selection of one of the four registers of the 8255A (00 selects port A, 01 selects port B, 10 selects port C, and 11 selects the control register).

Figure 4 8255A Pin Diagram



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RESET A high on this input clears all internal registers.

These input signal requirements are mostly, but not completely, compatible with the Color Computer signals available at the cartridge connector. The two address lines can be connected directly to the two lowest order bits of the Color Computer address lines. We can use Y6 (SCS) directly for the chip select (CS) input. However, the Color Computer's reset signal is low when active instead of high as required by the 8255A. This signal will have to be inverted. Also, the Color Computer has only one line for both read and write, while the 8255A requires separate signals with both being active when low.

The modification of these latter signals requires a slight detour into the field of logic gates. Logic gates have two inputs and one output. For example, and OR gate will have a high output when either of the inputs is high. The AND gate has a high output only when both of the inputs is high. The NOR and NAND gates are just OR and AND gates with an added inverter on the output (compliment of the OR and AND operations). For example, the NAND gate has a low output when both inputs are high, and has a high output otherwise. A good (and cheap!) reference for logic gates and their applications (and which covers many other common integrated circuits) is the Radio Shack *Engineer's Notebook II*[4]. It is available at under $3 at Radio Shack.

A logic signal can be inverted by feeding it into both inputs of a NAND gate. The output will be high if the inputs are low, and low if the inputs are high. Nearly all digital circuits have several logic gates, which usually come as four gates on a 14-pin chip, and we will make use of NAND gates on our I/O board.

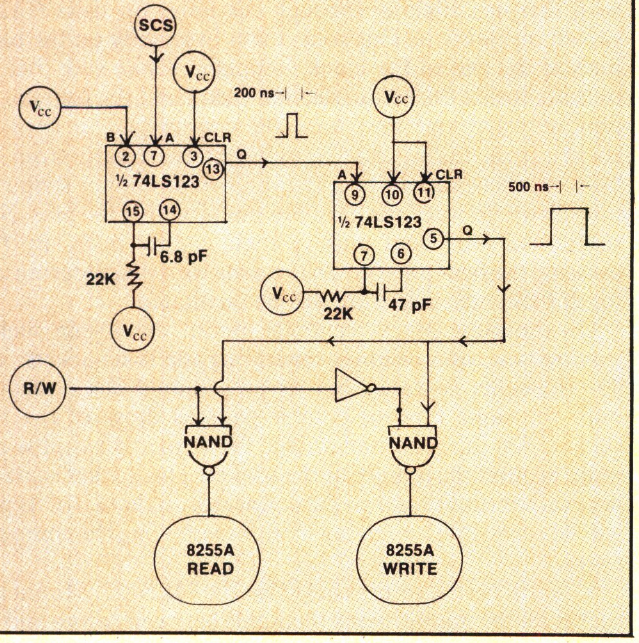
Therefore, the Color Computer's RESET signal will be first fed to both inputs of a NAND gate on a 74LS00 chip, and the gate output will be connected to the 8255A RESET pin. The R/W signal requires a little more work to get acceptable 8255A READ and WRITE signals. On some Color Computers you can use the R/W signal directly for the 8255A WRITE signal (and the inverted R/W signal for READ), but mine wouldn't, and neither would half of those I tested. I recommend that the READ and WRITE signals be generated as described next.

The 8255A READ and WRITE signals must go high again during their operation *before* the CS, A0 or A1 lines change. In fact, the WRITE must return high at least 20 nanoseconds before the lines change. So, what is needed is WRITE pulses and READ pulses which only go low 100-200 nanoseconds after SCS (chip select), and return high 100-200 nanoseconds before SCS does.

The solution is a 74LS123 "one-shot" chip, and a couple more NAND gates (which you already have on the 74LS00 chip). The schematic diagram of this part of the circuit is shown in Figure 5. The 74LS123 is described on Page 52 of the Radio Shack *Engineer's Notebook II*[3], but note that the pin diagram on Page 52 has the labels for pins 9 and 10 reversed. This chip has two independent sections, each of which allow you to trigger on the state of two inputs, and the pulse length is controlled by the value of an external capacitor. I used the first section to trigger a short pulse 200 nanoseconds (ns) when SCS goes low. The trailing edge of this short pulse is then used to trigger the second section of the 74LS123 for a final output pulse of about 500 ns.

This resulting pulse is shaped and timed perfectly relative to the SCS (chip select) signal to be a READ or WRITE pulse. Note also that we only need this special READ/

Figure 5 Creation of READ and WRITE signals with a 74LS123



WRITE signal on our board when, in fact, the chip *is* selected. Therefore, we can use the R/W and inverted R/W signals to gate on (with a NAND gate) this new specially designed pulse to produce perfect READ and WRITE pulses, just when we need them.

Since the two address lines of the 8255A are connected to A0 and A1 of the Color Computer address bus, and the chip select is connected to SCS, we can use the addresses FF40-FF43 for the four registers of the 8255A. These locations can be treated just as any other memory locations. Note that the four registers do not have unique addresses since FF50-FF53 (or even FF44-FF47 — only the FF and the last two bits matter) will also address the registers. With further address decoding (using address lines besides A0 and A1) you could even add more PPIs to the board, each separately addressable.

Building The Interface

Assuming that I have you sufficiently hooked on the idea, the next step is to build the I/O board. I must confess that I had a little help in building the board — my 12-year-old daughter did most of the work.

I am aware of no widely available, reasonably priced PC board which is specifically designed for the Color Computer, but there are several which will work with a little modification. The main requirement is that the board have an edge connector with at least 40 pins (20 on each side) with 0.1 inch spacing. Radio Shack sells a board, catalog number 276-165 which is my first choice. It is large enough to accommodate future additions, already has the right number of pins, and has edge connectors at both ends (the second one might be useful to connect a cable for a future application). It also costs less than the others I considered. Radio Shack also sells a board about half the size of the recommended one. It has plenty of room for the I/O interface, but not much room for anything else that you might want to add later. You will be better off with the flexibility of the larger board.

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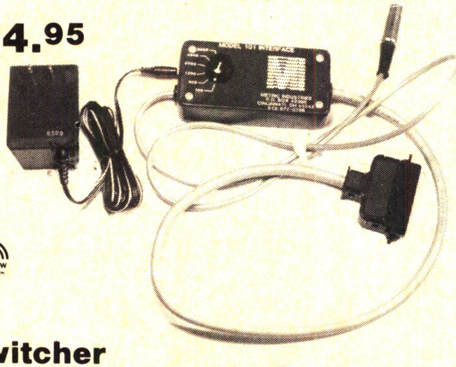

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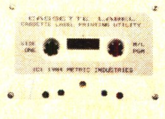

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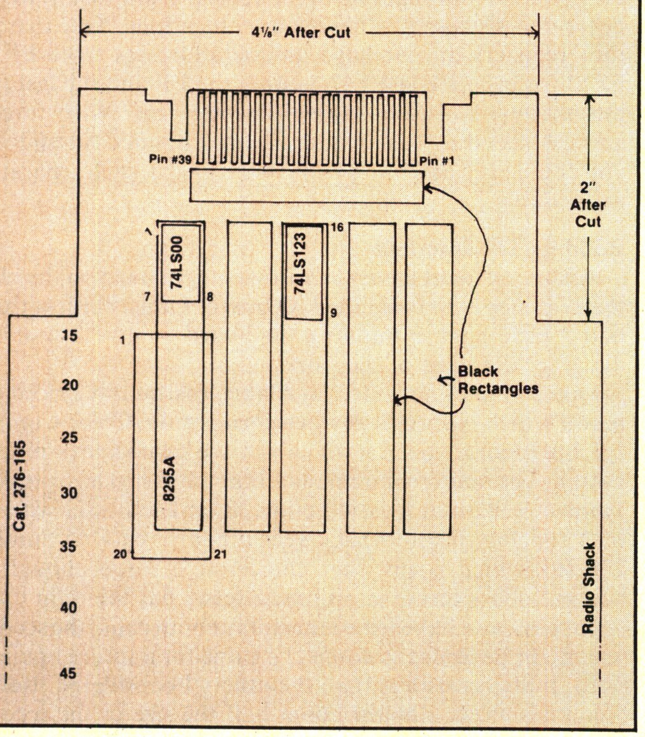
Figure 6 Preparation of the PC board showing socket locations



Whatever board you use, it must be cut down to fit the cartridge slot. Figure 6 shows the finished dimensions for the part which is plugged into the cartridge slot (the rest of the board can be any size). If your board has more than 20 pins on each side of its connector, the others must be cut off in getting down to the required dimensions. Keep the middle 20 pins and cut down the center of the pins on either side of the middle 20. After making these cuts, strip off the remaining half of the pin conductor material of the pins which were cut (leaving intact the board underneath). This narrow board area left at the edges of the connector will serve to guide the pins to their proper mating pins in the cartridge slot.

If you are using the Radio Shack board, the connector is okay as it is. However, the edges of the board near the connector must be trimmed because it is too wide for the cartridge slot. Draw a line along the outermost row of holes on each edge of the board and extend it to the end of the board (the end with the low-numbered rows). Cut along the line up to the fourteenth row of holes using a nibbling tool, jigsaw, or small hacksaw. Repeat on the other side.

The board and other parts you will need are shown in Table 3, along with some suggestions for sources. Where more than one source is listed, my personal preference is listed first. In case you can't find some of the parts locally, I have arranged for HIB Associates, 3505 Hutch Place, Chevy Chase, Md., 20815, to handle mail orders at the prices listed in the table. Or, if you prefer, you can get all the parts listed from HIB for $27 (include $2 for postage and handling on all orders for parts).

Now take a good look at the board. The side with the copper pads is the wiring side and will be the bottom side as the board is inserted into the cartridge slot. The side with the black rectangles is the component (top) side where the chips will be mounted. Note that the two halves of the board are not exactly alike, and that the instructions here assume that the end with the low-numbered rows is used for the interface.

Place a 14-pin socket on the component side of the board with the pins sticking through the holes on rows 6-12 as shown in Figure 6. This socket will fit exactly on the black lines at the end of the black rectangle. Make sure that the pins are inside the rectangle, and then bend the four corner pins outward and over onto the copper pad to keep the socket from falling off. Looking at the board from the bottom, there should be a two-hole-wide copper strip running down between the pins, but not touching the pins. Now solder the four bent pins to their copper pads. By first pressing the bent pins flat on the pads with the soldering iron for 2-3 seconds, soldering will be facilitated.

On the same black rectangle mount the 40-pin socket, leaving two rows of holes separating the two sockets. The 40-pin socket is wider, but its pins should come through onto the same kind of copper pads as those of the first socket. Again, bend and solder the corner pins, plus two more around the middle of the socket. This socket is placed here rather than closer to the connector so that all of its pins will be accessible for testing without removing the computer cover.

You will need a 16-pin socket for the 74LS123. Mount this socket on the middle black rectangle between rows 6 and 13, using the same procedure as for the other sockets (there will be one black rectangle between the two we are using). For this socket it will be more convenient to make many of the connections to the pads rather than the pins. Therefore, bend and solder to the pads the pins 2, 3, 5, 6, 8, 10, 11, 14, 15 and 16 (the pins do not contact the pads unless they are soldered). Then any wires to be connected to these pins (most of the connections will be jumpers from one of the buses) can be made to the corresponding pads.

Before starting to run the wires, I found it helpful to label the connector pins with numbers with a felt-tip pen for at least pins 1 and 39 on the top (component) side of the board, and 2 and 40 on the bottom (wiring) side of the board. Refer to Figure 1 to make sure you label the pins properly. When wires must be soldered to the top connector pins, the wire

Table 3
Parts List and Approximate Prices

Item	Sources
1. PC Board, 276-165	Radio Shack ($10)
2. 40-pin socket	Heathkit, Radio Shack ($1)
3. 16-pin socket	Heathkit, Radio Shack (50¢)
4. 14-pin socket	Heathkit, Radio Shack (50¢)
5. Intel 8255A	Heathkit ($11)
6. 74LS00	Heathkit, Radio Shack ($1)
7. 74LS123	Heathkit ($2)
8. Capacitors, .1μF (3)	Radio Shack (75¢)
9. Capacitor, 47 pF	Heathkit, Radio Shack (15¢)
10. Capacitor, 6.8 pF	Heathkit (15¢)
11. Resistors (2), 22K ohm	Radio Shack (20¢)
12. Resistor, 330 ohm	Radio Shack (30¢)
13. LED	Radio Shack, Heathkit (50¢)

Items 1-13 above available from HIB (see text). Prices listed are approximate for Radio Shack and Heathkit. (Heathkit parts are not listed in their catalog, but are carried by Heathkit Electronic Centers in some major cities.)

should pass through the holes in the small rectangle in front of the pins and be bent over to contact the proper connector pin. Then the wires can be soldered to the pins.

It is also helpful to label the four corners of each socket with the corresponding pin numbers. For each IC socket, pin 1 should be at the upper left corner when looking at the component side of the board as shown in Figure 6. Turn the board over and label the socket pins (pin 1 will now be at the upper right) by writing the numbers on the board next to the pins.

The two-hole-wide copper strips which run along each side of the sockets on the wiring side can be used to supply +5 volts (V_{cc}). These strips will be referred to as the V_{cc} "bus." Similarly, the strips which run directly under the sockets can be connected to ground and will be called the ground bus.

Table 4
Wiring List

From	To	Signal
CC-9	V_{cc} Bus	+5 V (V_{cc})
CC-33	GND Bus	Ground
74LS00-7	GND Bus	Ground
8255A-7	GND Bus	Ground
74LS123-8	GND Bus	Ground
74LS00-14	Vcc Bus	Vcc
8255A-26	V_{cc} Bus	V_{cc}
74LS123-2	V_{cc} Bus	V_{cc}
74LS123-3	V_{cc} Bus	V_{cc}
74LS123-10	V_{cc} Bus	V_{cc}
74LS123-11	V_{cc} Bus	V_{cc}
74LS123-16	V_{cc} Bus	V_{cc}

22K resistor between V_{cc} and 74LS123-7
22K resistor between V_{cc} and 74LS123-15
6.7 pF capacitor betweeen 74LS123-14 and 74LS123-15
47 pF capacitor between 74LS123-6 and 74LS123-7

From	To	Signal
CC-18	74LS00-1	R/W
74LS00-1	74LS00-2	R/W
74LS00-2	74LS00-13	R/W
74LS00-3	74LS00-10	R/W compliment
CC-5	74LS00-4	RESET
74LS00-4	74LS00-5	RESET
74LS00-6	8255A-35	RESET
74LS123-5	74LS00-9	Output of 74LS123
74LS00-9	74LS00-12	Output of 74LS123
74LS00-11	8255A-5	READ
74LS00-8	8255A-36	WRITE
74LS123-9	74LS123-13	200 ns delay pulse
CC-36	74LS123-1	SCS/CS
CC-36	8255A-6	SCS/CS
CC-19	8255A-9	A0
CC-20	8255A-8	A1
CC-17	8255A-27	D7
CC-16	8255A-28	D6
CC-15	8255A-29	D5
CC-14	8255A-30	D4
CC-13	8255A-31	D3
CC-12	8255A-32	D2
CC-11	8255A-33	D1
CC-10	8255A-34	D0

.1 μF capacitors between V_{cc} and ground near each chip's V_{cc} pin.

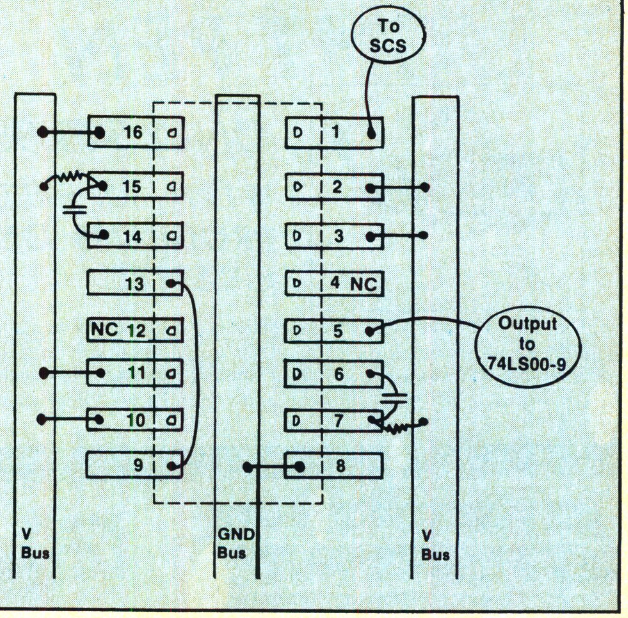
Follow the wiring list in Table 4. Use #30 wire for all logic signals (address and data lines, control signals, etc.) and regular (single-conductor) hookup wire for the power and ground connections. Do not insert the IC chips into the sockets until all wiring has been completed. Because it is easy to make a mistake on the connections on the 16-pin socket, Figure 6 shows these connections from a wiring side view.

The computer should be turned *off* when inserting or removing a cartridge or PC board from the cartridge slot. *Failure to do so can result in damage to the computer.* Radio Shack has built in a measure of protection for their cartridges by trimming about a millimeter off the leading edge of pin 9 (+5 volt pin) of their cartridge connectors. If a Radio Shack cartridge is accidentally removed or inserted with the power on, it probably won't be fatal (but don't press your luck). We can give ourselves that same measure of protection by trimming back pin 9 on our I/O board. Use a sharp knife or razor to cut through the metal strip about one mm back from the ends of the other pins. Then peel the cut-off strip from the board, leaving pin 9 a little shorter than the others. Since it is very easy to have a board come out of the cartridge slot by accident when you are testing or using it, be sure to give yourself this little safety factor.

After completing the wiring (and before the ICs are inserted) use a continuity checker if you have one to test all connections. If you don't have one, carefully examine all solder points, and then check the board against the wiring list one more time. Check especially the wiring of the 74LS123 against Figure 7, and for any stray bits of solder between the pads. Warning: You can destroy the microprocessor and SAM chips with improper connections.

When you have satisfied yourself that all is well, insert the chips into the sockets. If you are doing this for the first time, be extremely careful. You will probably have to bend the chip leads slightly in toward the chip to get them lined up with the socket holes. Once everything is lined up, apply pressure to start the insertion. Once it starts in, stop and check all leads to make sure none are being bent. Press down

Figure 7 Pin connections for 74LS123 (wiring side)



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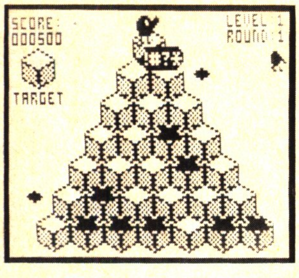

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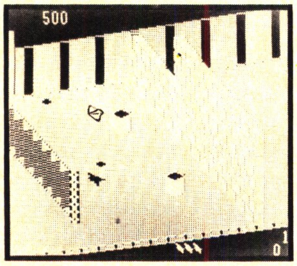

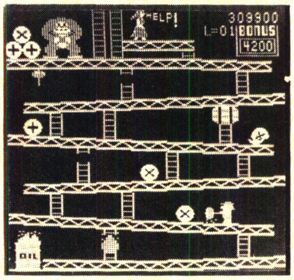

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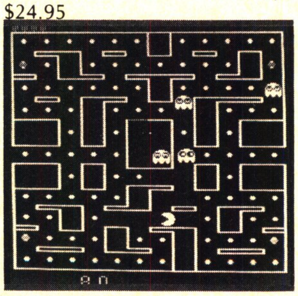

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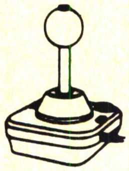

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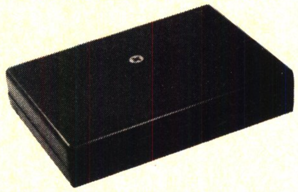

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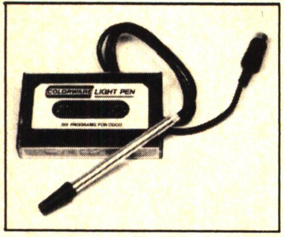

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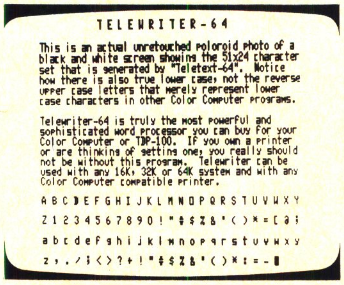

```
TELEWRITER-64

This is an actual unretouched poloroid photo of a
black and white screen showing the 51x24 character
set that is generated by "Teletext-64".  Notice
how there is also true lower case, not the reverse
upper case letters that merely represent lower
case characters in other Color Computer programs.

Telewriter-64 is truly the most powerful and
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used with any 16K, 32K or 64K system and with any
Color Computer compatible printer.

A B C D E F G H I J K L M N O P Q R S T U V W X Y
Z 1 2 3 4 5 6 7 8 9 0 ! " # $ % & ' ( ) * = [ @ ;
a b c d e f g h i j k l m n o p q r s t u v w x y
z , . / ; < > ? + ! " # $ % & ' ( ) * : = - █
```

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Included free with 'Real Talker' is Colorware's remarkable Text-to-Speech program. This is a truly powerful machine language utility. What it does is automatically convert plain English to speech. And it has an unlimited vocabulary! For example, use it in the direct mode: Type in a sentence or a paragraph, even mix in numbers, dollar signs, etc., then press enter. The text is spoken. At the same time a phoneme string is generated which can be saved to cassette or disk, modified or used in a Basic program.

We originally planned to sell this major piece of programming for about $40.00 but decided it was so useful that no 'Real Talker' user should be without it. Besides, it really shows off the capability of 'Real Talker'.

Also included with 'Real Talker' is our unique Phoneme Editor program. It allows you to explore and create artificial speech at the phoneme level. Phenomes are the fundimental sounds or building blocks of word pronunciation. There are 64 different phenomes, as well as 4 inflection levels at your disposal. Creating and modifying speech at the phenome level is both fascinating and educational. The Phenome Editor may also be used to customize the pronunciation of speech produced by the Text-to-Speech program.

You don't have to use any of our utility programs though. If you write your own Basic Programs, you will find the pocket sized Votrax Dictionary (included free) is all you need to make your own Basic programs talk. This dictionary gives you quick access to the phenome sequences used to create approximately 1400 of the most used words in the English language.

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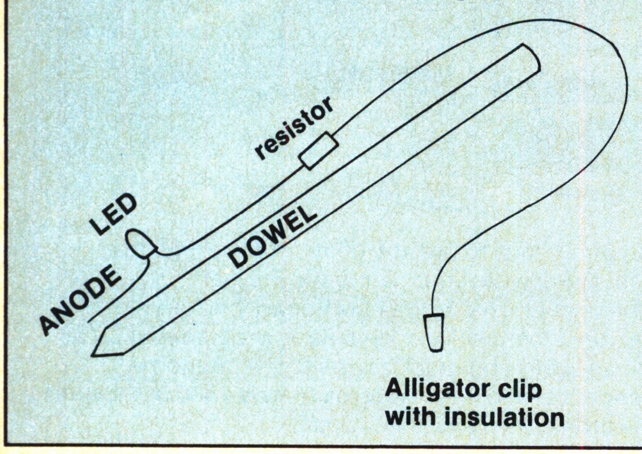
until the chip is almost seated. You might want to leave it out slightly the first time in case you have to remove it later (use a tiny screwdriver to carefully pry it out if that becomes necessary).

For testing the board you need a logic probe. For about $1 you can make yourself a perfectly good one: Cut off a pencil-sized piece of small wooden dowel (or just use a pencil) and sharpen it in a pencil sharpener. Solder a 270-350 ohm resistor to the cathode lead of an LED (light emitting diode). Then solder a two-foot piece of flexible (insulated) wire to the other side of the resistor and attach an alligator clip to the free end of the wire. Or, buy a wire with alligator clips at each end, cut one clip off, and solder the wire to the resistor. Stretch out the leads of the LED/resistor/wire to make one straight line as shown in Figure 8, and tape them to the dowel with about ¼-½ inch of the anode lead of the LED extending beyond the point. Tape beside the LED, but don't cover it — we have to see it when it lights up.

Figure 8 Construction of Logic Probe



When the alligator clip is connected to ground, the LED will light up if the probe tip is touched against something at +5 volts. You may want to pass a half-inch piece of stiff wire from the component side of the board through to the ground bus and solder it so you will have a convenient point to connect the alligator clip of the logic probe while testing.

Now we're ready for the big moment! Turn the computer off, insert the board (you may need to support the end of it), and then turn the computer on again. Connect the alligator clip of the probe to ground, and test the probe by touching pin 26 (V_{cc}) of the 8255A (do this from the component side of the board). If you have wired the pin correctly, the LED will light up brightly indicating the presence of +5 volts. Now try the next pin, number 27. This time the probe should light up, but only dimly. Pin 27 is a data line and its state (+5 volts or ground) is changing at almost a million times per second. The LED just indicates an average reading. Test the READ, WRITE, and chip select input pins. They should glow almost as brightly as with V_{cc} since they are normally high. Check pin 35 (RESET) — it should always be low (LED not illuminated) except when you press the Color Computer RESET button (try it). Test all the data lines (pins 27-34) and the address lines (pins 8 and 9) to make sure that the probe gives at least a dim glow. If any of the above tests indicate a problem, turn off the computer, remove the board (while holding up the cartridge slot with your fingers) and check your wiring.

If everything seems to be in order, let's see if we can communicate with the 8255A. Set all ports for output with *POKE &HFF43,&H80*. Test pins 1-4 and 37-40 (the eight lines of port A) and you should now find all zeros (no illumination). Now *POKE &HFF40,&HFF* (Hex number FF is 11111111 in binary) and if it's working, you should now find that all of the port A pins have ones and will light the logic probe. *POKE &HFF40,0* to set port A back to all zeros and test again. You might also try an alternating bit pattern like &HAA or &H55. Test the other ports in similar manner (refer to the pin diagram to find ports B and C). Port B is at address FF41 and port C is at FF42.

Try writing something to the A register and then reading it back with a PRINT HEX$(PEEK(&HFF40)). You won't have to change the control word for this kind of "internal read." Reading from the outside will have to wait until you have something connected to the I/O ports. If you try it now you will just get whatever noise is around.

Applications

I hope that you already have some ideas for some ways to use the I/O board besides lighting up a logic probe. Clearly it can be used to check on the status of switches (the switches might be the detectors of a security system, for example) or to control read relays (these applications are discussed in the article by William Barden). However, one of the objects of this article was to get you interested in digital circuits, so in the next article I will give an example of how the I/O interface can be used to control another large scale integrated circuit. The chip I will use is a General Instruments Sound Generator Chip (AY-3-8910). It has three independent tone channels, a noise channel, envelope control and even two more I/O ports (so you don't really "lose" an 8255A I/O port by connecting it to the AY-3-8910).

References

[1] Barden, William. "A General-Purpose I/O Board for the Color Computer." *Byte,* June 1982, p. 261.

[2] *Color Computer Technical Reference Manual*, Radio Shack Cat. No. 26-3193.

[3] Goldsbrough, Paul F. *Microcomputer Interfacing With The 8255 PPI Chip.* Howard W. Sams & Co., Indianapolis, Indiana, 1979.

[4] Mims, Forest M. *Engineer's Notebook II: A Handbook Of Integrated Circuit Applications.* Radio Shack Cat. No. 276-5002, 1982.

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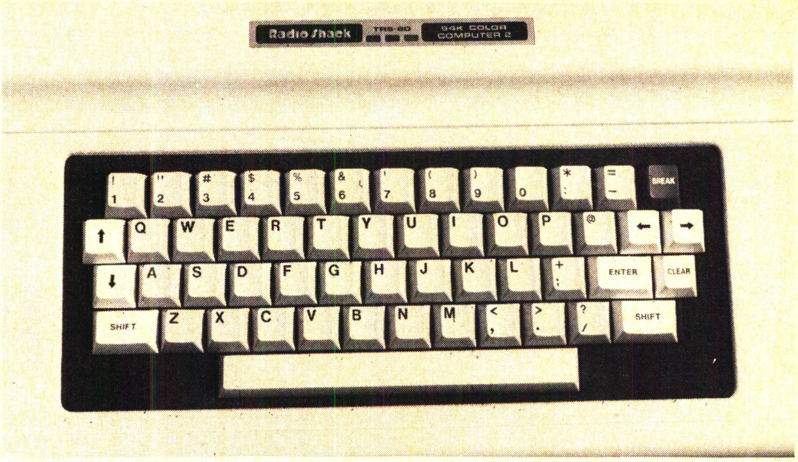
Surprise! A New Keyboard For The CoCo



After three and a half years of selling the Color Computer with keyboards that some consider less than perfect, Radio Shack has finally put full-size keys on the CoCo 2 keyboard. As you can see in the photo, they are very much like the keycaps used on the IBM PC and other popular "high-end" computers; the labels on the keys are set in the upper left of center, which seems to be the fashion nowadays, and the whole thing gives a very modern look to the CoCo.

The actual mechanism appears to be the same as that of the "old" CoCo 2 keyboard but with the new, taller keytops. A spot check at a local Radio Shack store indicates that computers manufactured since April (coded "4A4" on the box) have the new keyboard. Another bit of good news is that the new keyboard comes at no increase in price. If you want this keyboard for your present CoCo, the upgrade price is still $49 plus installation; Radio Shack also tells us that their upgrade kits are only available installed by the service center.

Our brief typing tests showed that the new keyboard has a good feel and is better for fast typing than the previous keyboards. The keys still don't go down as far as those on other computers with "full-travel" keyboards (such as Radio Shack's Model 4), but this doesn't seem to have much ill effect on "type-ability." The keyboard compares closely with that of the new Apple IIc which, like the CoCo, has a slim keyboard assembly. All in all, this is a very welcome surprise for CoCo enthusiasts.

— Ed Ellers

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• Warranty	180 days	90 days
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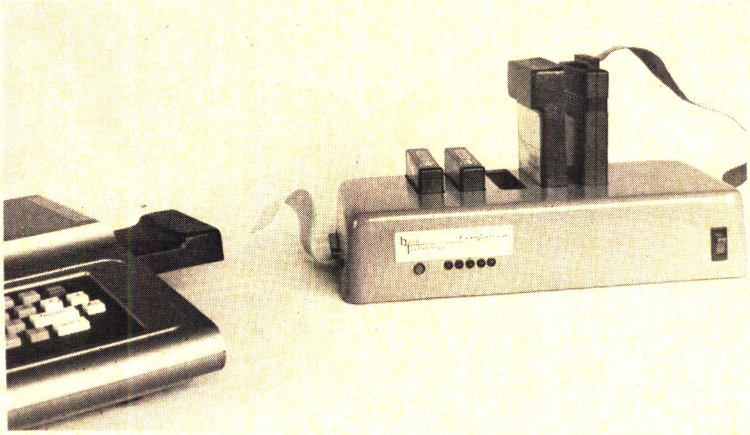

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EDUCATION NOTES

16K ECB

Hexadecimal Happiness

By Steve Blyn
RAINBOW Contributing Editor

The number system that we are accustomed to is called the decimal or base 10 system. Many people believe that it is difficult enough to learn all of the rules and uses of our own system without introducing other systems. We will try to make this introduction somewhat easier in this article.

Computers mainly use three base systems — the binary, the decimal, and the hexadecimal base system. They represent base 2, 10, and 16.

Most people readily accept the fact that each bit can either be turned on or off (0 or 1). This is the justification for computers using the binary or base 2 system. It really is the mother or native tongue of all microprocessors.

The decimal or base 10 system is also easily justified as it is the normal way that we use numbers. We have no problem understanding that the number 279 refers to two hundreds, seven tens, and nine ones.

It would seem that these two base systems would be enough for anyone. Why then do computers also need a hexadecimal or base 16 system? Since computers often deal in large numbers and often do many mathematical calculations, the base 16 system is more convenient and faster for a microprocessor to use.

Our computer stores information in bytes which consist of eight bits. Often, two bytes or 16 bits must be addressed at the same time. This is the other reason for learning the Hex system.

Other bases are really not that difficult to understand and work with. The trick is to first deal with circumstances in our everyday lives where we naturally deal with other base systems. If we can relate other bases to things we are all familiar with, then we can expect less student resistance to learning about other bases.

As any intelligent person knows, bases refer to baseball. Well, that's not far from the point. Baseball deals with a base 4 system to a small extent. A team does not get 10 base hits before it gets a run in any inning — it gets four. The fourth hit causes the man on third to come home and score a run. It is as if there is no fourth base, only first, second, and third. When a player advances to base 4, he really has scored a run. This is a simple approach to base 4.

Base 5 also has an analogy in our everyday lives. Think of pennies, nickels, and a quarter. If one were collecting pennies, he would likely want to trade every five pennies in for a nickel. If you had nine cents, it would be more convenient to have one nickel and four pennies. This could be represented as 14 in base 5.

Similarly, every time you got up to five nickels, it would be better to trade them in for a quarter. Thus, if you had 37 cents, it would be more convenient to have one quarter, two nickles and two pennies. A base 10 number of 37 is, therefore, represented as 122 in base 5.

Hexadecimal, unfortunately, is not so easy to explain as the other bases were. There are no ready instances of using 16s in everyday life. If we were dealing in eights, we could discuss pizza pies and slices.

Base 16 is further confounded by the fact that we have no numerals past nine. Since the amount of 15 can fit into any place value in base 16, we need six items to be representatives of the amounts 10 through 15. These are represented by the letters A,B,C,D,E, and F. An A is, therefore, worth a 10, B an 11, C a 12, D a 13, E a 14, and finally F is a 15.

The Hex number 1234 represents four ones, three 16s, two 256s and one 4096. This adds up to the regular base 10 decimal number 4660. Check on the chart below.

4096	256	16	1
1	2	3	4

(Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He and his wife, Cheryl, own Computer Island.)

Here is the computation for the numbers.

4*1= 4
3*16= 48
2*256= 512
1*4096=4096
———
Decimal 4660 equals Hex 1234.

Hex is often abbreviated by &H or sometimes $. In our previous example, we could say 4660=&H1234.

Here are some examples to get you started.

Base 10 Decimal #	=	Base 16 Hex #
14		E
20		14
100		64
812		32C
2748		ABC
49152		C000

Take heart, it is not really endless. The highest number our computer uses is 65535 and this converts to Hex FFFF. As the numbers get larger, the Hex numbers really are easier to deal with.

Our program lets you practice these conversions. Lines 50 through 90 set up the menu. Line 100 lets you choose to practice Hex to decimal or decimal to Hex or to quit. Don't quit too soon, though. You'll get the idea sooner or later.

Lines 120 through 270 let you input any integer up to 65535. Then try to convert it to its Hex equivalent. The program will tell you if you are right or wrong and will print out the correct answer.

Lines 290 through 430 will do the same procedure in reverse. You may type in a Hex number and try to convert it to the regular base 10 equivalent.

After each group of five examples, you will receive your score and be able to return to the menu. Keep going until you have mastered this skill.

220...... 245
END 175

The listing:

```
10 REM"<C>STEVE BLYN,COMPUTER IS
LAND,NY,1984
20 REM"HEXADECIMAL HAPPINESS"
30 CLS8
40 PRINT@5,"hexadecimal happines
s";
50 PRINT@77,"MENU";
60 PRINT@134,"1.DECIMAL TO HEX";
70 PRINT@198,"2.HEX TO DECIMAL";
80 PRINT@262,"3.END THE PROGRAM"
;
90 PRINT@357,"CHOOSE A NUMBER";:
INPUT N
100 IF N=1 THEN 120 ELSE IF N=2
THEN 290 ELSE IF N=3 THEN 110 EL
SE 90
110 CLS:END
120 CLS7:PRINT@64,""
130 CT=CT+1:'THE COUNTER
140 PRINT@64,"TYPE A DECIMAL # "
;
150 LINEINPUT A$
160 A=VAL(A$)
170 IF VAL(A$)>65535 THEN PRINT@
96,"  SORRY,65535 IS THE LARGEST
 #   THAT THE COLOR COMPUTER USE
S.":SOUND200,30:GOTO 120
180 PRINT@128,"ANSWER IN HEX...&
H";
190 LINEINPUT B$
200 H$=HEX$(A)
210 IF B$=H$ THEN PRINT@200,"COR
RECT";:SOUND230,3:RT=RT+1
220 IF B$<>H$ THEN PRINT@200,"SO
RRY";:SOUND100,1
230 PRINT@256,"THE HEX # IS ...&
H";HEX$(A)
240 IF CT=5 THEN PRINT@386,"YOU
GOT";RT;"OUT OF 5 CORRECT.";
250 PRINT@453,"PRESS ENTER TO GO
 ON";
260 AN$=INKEY$
270 IF AN$="" THEN 260 ELSE IF C
T=5THEN RUN ELSE 120
280 '****** SECOND PART ******"
290 CLS6:PRINT@64," "
300 CT=CT+1
310 PRINT@64,"TYPE A HEX #... &H
";
320 LINEINPUT C$
330 J$="&H"
340 AN=VAL(J$+C$)
350 PRINT@128,"ANSWER IN DECIMAL
=";:LINE INPUT D$
360 D=VAL(D$)
370 IF D=AN THEN PRINT@200,"CORR
ECT";:SOUND200,3:RT=RT+1
380 IF D<>AN THEN PRINT@200,"SOR
RY";:SOUND100,1
390 IF CT=5 THEN PRINT@386,"YOU
GOT ";RT;"OUT OF 5 CORRECT.";
400 PRINT@453,"PRESS ENTER TO GO
 ON";
410 PRINT@256,"THE DECIMAL # IS
";AN
420 AN$=INKEY$
430 IF AN$=""THEN 420 ELSE IF CT
=5 THEN RUN ELSE 290
```

PIPELINE

FINALLY, A NEW KEYBOARD. Yes, at long last Radio Shack has decided to put a greatly improved keyboard on the CoCo 2. The somewhat less than desirable previous models have long been a point of departure for most users in their praise of the Color Computer. But now, a keyboard modification doesn't have to be the first thing on your wish list after you purchase one.

The new keyboard has a fine, sleek profile; full-size keys with a very nice touch after you get accustomed to them; and it speeds typing in programs or text tremendously (this very column was keyed in on it at near-light speed, I assure you). It is a welcome addition to a machine that is becoming harder and harder to fault in any way.

On the down side, however, all of you who would like one of the new keyboards on your present CoCo will have to pay Radio Shack $49.95 plus installation charges for the upgrade. But, of course, you can't expect hardware upgrades to be retroactive, can you?

For a look at the new keyboard, see the photo on Page 149.

* * *

SOME CHANGES are coming at Radio Shack, and one of them involves a well-known name — Ed Juge. Juge, who is to be the keynote speaker at RAINBOWfest in Chicago, has been named to be Director of Market Planning. This new position involves working on various projects, but especially with the news media. Juge has had long experience in this particular phase and has probably been best known for his long-running "Tandy Topics" column in *Basic Computing* (formerly *80-U.S. Journal*), which recently went out of business. Juge was in charge of the business end of Computer Merchandising before this new move from the 15th to the 17th floor of One Tandy Center.

Moving in to take Juge's place in Computer Merchandising is Van Chandler, who was director of applications software. Chandler brought some very positive and unique innovations to Radio Shack's software program and is expected to do some great things in his new position. Chandler's move puts the computer merchandising effort at Radio Shack in his hands and those of Mark Yamagata, who is responsible for the Color and Portable computers. And, of note, a change has been made in the Portable Computer line as well, where Stuart Weinstock has replaced Bill Walters as product line manager.

We see these moves as positive ones for Tandy. Close to home, it keeps the Color Computer marketing team intact (Yamagata and product line manager Barry Thompson), reflecting, we believe, confidence in that leadership's excellent work with CoCo. Juge's move to Market Planning brings a person exceedingly knowledgeable into the media area — one which Radio Shack seems to be seeing as more important each day. And Chandler's promotion brings a "star" from another Tandy area into the computer merchandising lineup.

* * *

IF YOU DON'T already know, Radio Shack's *Microcomputer News* will cease to exist after its July issue. The "newsletter" which Radio Shack started in support of the Model I and expanded into a well-done piece will not longer be available. Editor Bruce Elliott, who did an excellent job with *Microcomputer News*, has been reassigned to other areas. How will Radio Shack honor its subscriptions to *Microcomputer News* — by offering readers an opportunity to receive subscriptions to eight other computer magazines for the duration of the subscription term. Those magazines, of course, include the RAINBOW and PCM — our sister publication which covers both the Model 100 Portable Computer and the Tandy TRS-80 2000.

* * *

EULOGY ON TAPE. We deeply regret having to pass along the news that *Chromasette Magazine* is going out of business. Since its first issue, *Chromasette* has done an outstanding job of supporting the Color Computer and supplying pertinent software at a reasonable price.

An agreement has been reached between *Chromasette* and THE RAINBOW to fulfill their subscription obligations with copies of RAINBOW ON TAPE. We feel confident that all of *Chromasette's* subscribers will be satisfied with the arrangement and, for those new recipients unfamiliar with RAINBOW ON TAPE, we welcome you to a vast new resource for your Color Computer.

To Dave and the rest of the staff at *Chromasette*: We at THE RAINBOW will miss your presence in the marketplace.

* * *

A NEW SERVICE is being offered by Newsoft — a news service — and they use the Color Computer exclusively throughout the operation. Newsoft News Service (NNS) is designed specifically to bring daily news and information to local bulletin board systems. It operates much like any wire service and is available to BBSs on a subscription basis for rates ranging from $8.50 a month for a BBS with "network status" to $24.95 for a one time, one month subscription.

Some of the regular columns being offered are a daily computer news column, a hardcore hackers' technical column, history, trivia, science, and a "women and computers" column.

For more information, contact Newsoft Inc. Computer Services, 2704 NE Everett St., Portland, OR 97232 or place a voice call to (503) 238-0741. Also, NNS has a free sample download available at 300 Baud on (503) 235-5114.

* * *

HOW ABOUT 128K? Yes, a line of 128K memory expanders has been introduced for the Color Computer by Dynamic Electronics Inc. These expanders mount inside the computer and are compatible with all existing software. The memories consist of two 64K memory banks which can be selected by either a miniature three-position switch or by software. Since each bank is totally independent, separate programs can be loaded and run in either bank. When banks are switched, the unselected bank is placed into the power-down mode with all variables and vectors being preserved. Control can be passed from one bank to the other by poking two values into a memory location.

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For more information, contact Dynamic Electronics Inc., P.O. Box 896, Hartselle, AL 35640; (205) 773- 2758.

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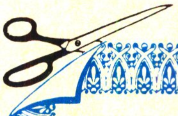

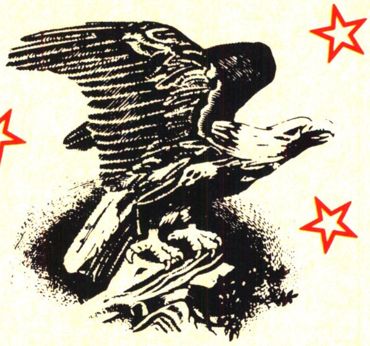

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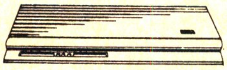

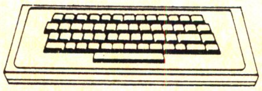

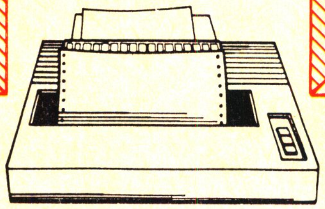

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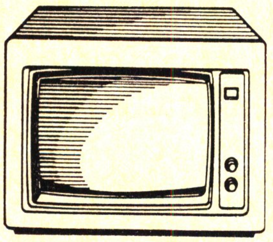

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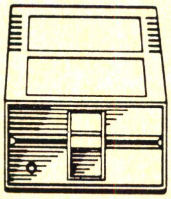

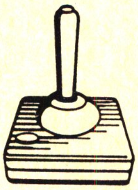

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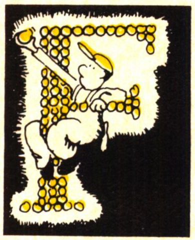
Announcing The RAINBOW's 2nd Annual Simulation Contest



By Charles Springer

Fanfare, please! Because of the immense popularity of Simulations and the superior quality of the programs submitted in last year's competition, THE RAINBOW has announced plans for the Second Annual Simulation Contest.

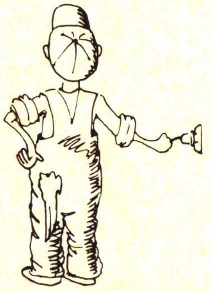
Frankly, THE RAINBOW staff enjoys these contests as much as the participants because the competitive atmosphere seems to be a catalyst for new breakthroughs in programming, challenging you to discover heretofore unexplored regions of CoCo's potential.

The winning entries in our 1983 competition — *Election '84* and *WarGame* — were comparable in quality and execution to many commercial programs on the market, better in many cases. And we're not just referring to CoCo's market.

Last year, remember, we relived the Civil War, traveled to the moon, to Mars and beyond, went bankrupt running a restaurant, made a million bucks as a manufacturer, survived a flood, lobbied for bills in Congress, assumed responsibility for mid-air collisions as an air-traffic controller, drowned while learning to sail, experienced the thrill of victory in the seventh game of baseball's World Series, and made it big with our own software business.

(Many of the entries in the 1983 contest are featured in a book on Simulations, which THE RAINBOW plans to publish in early fall.)

We're looking for an even greater variety of situations this year and expecting to see great improvements in graphics presentations because of the many advancements in pro-



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see NOV'83 Rainbow Review

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gramming tools and knowledge since the first contest.

That should be a clue that originality will be high on the judges' list when reviewing the submissions. Judges, especially, get weary of seeing the same kind of situations. Do we have to specifically mention outer space, for example? We enjoy the old standbys as much as the next person and don't let us deter you if you have a Simulation that you know will set the CoCo world on its ear, but variety is, indeed, the spice of life.

We offer some suggestions, just to get your creative juices flowing: The situations confronting the mayor of a large city, the decisions of a newspaper editor, the traffic controller of a metropolitan transit system, the dispatcher of a taxi-cab company, the state commissioner of highways, the head of a day care center, etc. The decisions people make in these kinds of situations are numerous and require careful evalution.

Use your own situation! You know better than anyone else what kind of decisions are required, the sweet taste of success, and the perils of failure. And you know that each situation has its own degree of excitement. We're not soliciting the ideas mentioned above because that would contradict our desire for originality. However, feel free to submit one of the situations mentioned above if you've had such an idea in the works for several months already.

While Simulations do contain some adventurous aspects, there is a big difference between Simulations and Adventure games. Simulations contain rational decision processes in realistic situations based upon one's normal preparation for a particular challenge, situation or job, taking into consideration the available options a person could reasonably assume to be a normal part of that experience. Adventure games, on the other hand, usually involve make-believe situations involving fantasy characters, escape situations, and treasure hunts. Simulations would not involve a map or sorting through a lot of geographic directions unless, of course, you are a traffic cop. While Simulations and Adventure games differ in their nature, the rewards of a successful conclusion in either case can be just as great.

Our desire for fairness dictates that we establish a uniform set of guidelines by which each submission will be judged. We've already mentioned originality, of course. The other considerations include: 2) clarity of instructions, 3) ease of loading, 4) vocabulary, 5) grammar, 6) creativity, 7) realism, 8) resolution, 9) use of color, 10) responsiveness, 11) level of challenge, and, most importantly, 12) enjoyment.

Most of these elements are those that you probably would build into a Simulation anyway, but we're emphasizing them because we want you to be aware of the ingredients necessary for a successful experience. Besides, you may want to try to market one of your creations commercially someday and you'll find that the general buying public's demands will be even more difficult to satisfy. We also will be paying close attention to spelling because if CoCo programs are to be taken seriously as educational tools for our youngsters, it is an absolute necessity. Historical accuracy is important for the same reasons.

If you need an introduction to, or refresher course on, Simulations, you should refer to last year's top contest winners: *WarGame* and *Election '84*. Both were published in our November 1983 issue along with a wrap-up of last year's contest, including the judges' comments on many entries. One of last year's winners, Dr. Bob Tyson, also had an excellent Simulation, *Strategy Football*, in our August 1983 issue and has a Simulation tutorial elsewhere in this issue. Another Sports Simulation is *Basketball* by Gary Carter and appeared in the February 1984 RAINBOW. Both *Iowa Lemonade* and *Micro-Meltdown*, an excellent graphics Simulation, are in our April 1983 issue. Finally, of course, check out *Landlord*, also in this issue.

Now that we've shaken you up a bit, the good news is that many of THE RAINBOW's generous advertisers will be donating some wonderful prizes as they did last year (and in our recent Adventure contest) when our winners carted off Radio Shack disk drives, an Epson printer, and dozens of other prizes that included a wide variety of peripherals and high quality software.

Contest submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We really do not have the time to key in programs, obviously. All entries should be supported by some editorial commentary, explaining how the program works and loads. Please do not submit entries that are currently submitted to another publication.

Your entry must be received by THE RAINBOW no later than September 1, 1984, to be eligible for the competition.

This promises to be THE RAINBOW's most exciting contest yet, and, as usual, the winning entries will be published when we announce the results in an upcoming issue.

RULES: All programs must be original works, no "conversions." Entries must be postmarked by September 1, 1984, and become the property of Falsoft, Inc., publisher of THE RAINBOW. Decision of the judges is final. Duplicate prizes will be awarded in the case of ties. Winning programs to be featured in a special RAINBOW Simulation issue. Mark entries "Simulation Contest Editor" and send to THE RAINBOW, P.O. Box 209, Prospect, KY 40059.

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Three Trips To The Well

By Fred B. Scerbo
RAINBOW Contributing Editor

Editor's Note: Do you have a special program you would like solved in BASIC for your Color Computer but don't know how to go about writing the program. Submit your wish to Fred, c/o "Wishing Well," THE RAINBOW. We can't promise anything, but if your wish looks challenging enough, Fred may write a program to solve your problem. Remember, all programs resulting from your wishes are for your use, but remain the property of the author.

As you may have noticed, the last few installments of "Wishing Well" have been quite lengthy, including the programs which have often required at least 32K to run in their entire form. I will always try to offer ways in which those of you with only 16K can get something from "Wishing Well," since there are still a great number of you who have not gone the upgrade route yet. Therefore, this month's installment will include three more educational programs, all of which will fit in 16K. In fact, two of the programs will even work in standard Color BASIC for a non-Extended 16K machine as well as the MC-10 with the memory expansion. (The 4K version has too little working space for these listings so you may need the 16K expansion for the MC-10.)

The Wishes

Requests have continued to come in, not only c/o THE RAINBOW but in person and by phone. It seems quite a few educators have really enjoyed the flexible programs I listed several months ago as "the screen quiz programs." Since educational software is not only expensive but rarely deals with precisely the material you are teaching in class at any given point, many teachers have liked the idea of these "shell" programs which allow you to enter your own information and let the program create the test or quiz for you. This proves very handy for parents as well, especially when they want to have their kids reinforce their learning with the help of the family CoCo. (Many students I know also use these shells to create their own study materials to review for tests.)

(Fred Scerbo is a special needs instructor for the North Adams Public Schools. He holds a master's in education and published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.)

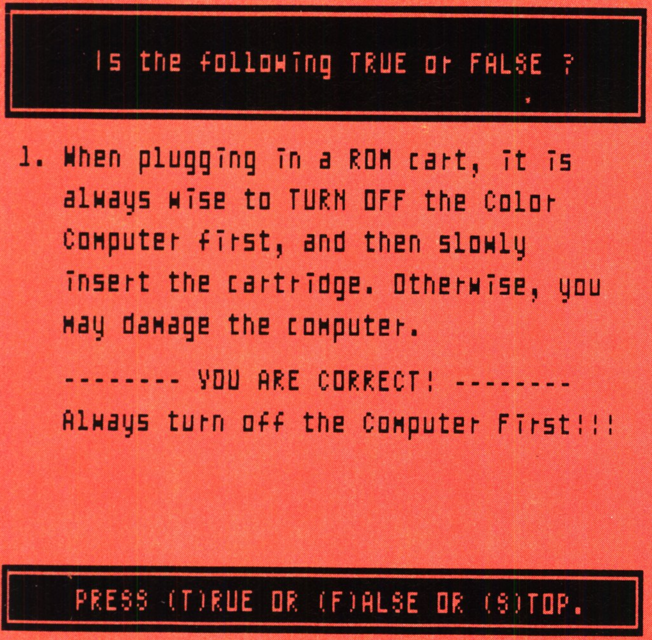
Since there have already been requests for more, I have taken this month to print three more flexible programs which can be filled with your own material and will not only review material, but will help instruct as well. (It also gives me a little breather since in coming months I hope to offer *Rockfest II* and *Fever II*. Believe me, those take time to write!)

The first listing is called *GRPH-T&F* and is a graphic version of the true and false quiz which I introduced at the first RAINBOWfest last year in Woodfield, Ill. While the screen quiz programs from several months ago were multiple choice in nature, the true and false quiz is exactly what it says. You supply the statements and indicate whether the statement is true or false (with a 'T' or 'F'). Since this information is placed in *DATA* statements at the end of the program, you can add up to 50 statements, save the program to tape or disk under a new name (i.e., *HIST-T&F* or *MATH-T&F*), and then reload the whole program when you wish to use it. As I have mentioned before, this method is much simpler than using text files which must be reloaded after the host program is loaded and run. This way, you load once, and the program is ready to run.

The original version shown out at RAINBOWfest was rather straightforward. A statement would appear on the screen and the student would simply press 'T' or 'F'. The computer would respond as to whether or not the answer was correct, and then give a score at the end of the quiz.

Many of the teachers I have shared this with have come up with another wish. They wished to know if there would be some way the computer could indicate *why* the statement was true or false.

Therefore, Listing 1 has this feature included. There is one catch, however. You must include the statement which explains the reason why the first statement is true or false. With this feature included, the program becomes instructional, as well as a review tool since it can be used to explain concepts in greater depth. Listing 2 contains the original text version which will work in 16K Color BASIC.



```
Is the following TRUE or FALSE ?

1. When plugging in a ROM cart, it is
   always wise to TURN OFF the Color
   Computer first, and then slowly
   insert the cartridge. Otherwise, you
   may damage the computer.

   -------- YOU ARE CORRECT! --------
   Always turn off the Computer First!!!

PRESS (T)RUE OR (F)ALSE OR (S)TOP.
```

Using The True-False Quiz Programs

Although both listings do nearly the same thing, they operate in a very different manner. When you type in Listing 1 (the graphics version), you will notice many *DATA* statements at the beginning of the program. These contain the graphic characters in upper- and lowercase, which were written for my word processor, *Wordclone*, and which appeared in the graphic multiple choice screen quiz. Take great care to type these lines in *exactly!* When you come to the *DATA* at the end, be sure to SHIFT '0' so as to get into lowercase when typing on your text screen. Even though the letters will be reverse video, they will appear in lowercase with descenders when the program is *RUN*.

The information in the program starts with *DATA* Line 1000, and is set up in the following fashion:

1000 DATA "Statement.", T, "Reason or explanation."

As you can see, we have three pieces of information. The first is the statement which appears on the screen. You should open and close this statement with quotation marks, since it is very likely that you will use commas in your statement. Remember, when we use a *DATA* statement, a comma indicates the end of the body of information. Therefore, use quotes around the first statement.

The next piece of information is either a 'T' or 'F' to indicate true or false. This need not appear in quotes, but you must include this since the computer has no way of telling if the statement is true or false. You have to tell it.

Next is your explanation of why the statement is true or false. This, too, must be surrounded by quotes in case you use commas in your punctuation. Notice that the three pieces of information are separated by commas. Therefore, there should be only *two* commas per *DATA* line, outside the quotes. It is wise, also, to use only one *DATA* line for all three pieces of information. This insures that your graphics text will not exceed what the screen can handle in the reserved space. Upon running the program, you will find that the screen is very readable in upper- and lowercase, and is suitable for rather lengthy sentences which might clutter the text screen.

Line 600 has been reserved for a graphics reward, as used in the other screen programs. You could use graphics from *Rockfest* or *Fever 1*. Simply renumber the lines so they fall between 600 and 989, making sure that the last line is a *RETURN* statement. (Refer to our previous articles for more details on how to do this.)

This graphics version also contains the option of stopping the quiz by pressing 'S'. This will proceed to the score card and give the option of rerunning the program. As always, each time you *RUN* the quiz, the order of the statements will be different, allowing endless uses of the program with the same information.

Be sure that the last statement in the program reads: *5000 DATA END, Program Title, END,* inserting the title you wish to use for this version, such as *History Quiz One*, and so on.

Let's take a look at Listing 2 for a moment. As I mentioned earlier, this is the text version in its earlier form. The program contains routines which will prevent word break-up or wrap-around. However, it will only print the statement and allow the student to answer 'T' or 'F' (no 'S' for stop). Also, no explanation is printed on the screen.

Why use Listing 2 *(TEXT-T&F)*? First, it will work in standard Color BASIC. Be sure to change the ['] to REM statements since Color BASIC does not recognize the single quote mark abbreviation for REM. The same would apply if you were using Micro Color BASIC on the MC-10. If typing this into the MC-10, be sure to change any *TIMER* statements to the number-9999, since the MC-10 does not have a timer. You will also notice that I have not used *ELSE* in the *IF . . . THEN* statements since MC-10 does not have *ELSE*. In this way, the program will work with both machines, and could be translated to an Apple IIe or some other computer that doesn't perform as many functions as a CoCo.

Another reason you may wish to use this version is that it is faster than the graphics version. Also, with younger students, you may wish to have less writing on the screen, and the larger letters might be more readable to them.

Unlike Listing 1, you need only two pieces of information with Listing 2:

1000 DATA "Statement",T

You do not include a reason after the 'T' or 'F'. You may also prefer to use all uppercase so as to avoid the reverse video of the CoCo's text screen.

Your last statement should be, of course:

5000 DATA END,Program title

In either program, if you get an ?OD Error, it means you have either forgotten Line 5000, have included an extra comma, or have forgotten one somewhere. Check your *DATA* statements to be sure.

The Verb Quiz

Listing 3 is very different from the first two listings because it is designed to quiz a student on the three tenses of irregular verbs. This wish resulted from the needs of a number of high school teachers in western Massachusetts who wanted a way to review these tenses on the computer.

The advantage to this program is that it will jumble the order of the three words forming the present, past, and past participle tenses. These three words would be displayed on the screen. The screen next tells the student which tense is to be used, and a sentence with a blank space is displayed at the bottom of the screen. For example, if the verb is SING, then the three choices would be:

SING
SANG
SUNG

The first blank sentence would read:

Today I . . . . it.

Therefore, for the present tense for this verb, the sentence should read:

Today I SING it.

The past tense would read:

Yesterday I SANG it.

The past participle would read:

I have SUNG it before.

Therefore, to make this program work, you may use any sets of irregular verbs (maximum 49). Ten sets are included for you. Each verb must have all three tenses, so each *DATA* line would read *1000 DATA DO,DID,DONE* in order of present, past, past participle. Your final line should read:

5000 DATA END,Quiz Title,END

Like the other programs, you must take great care with the use of commas. Also, if you are typing this into an MC-10, be sure to change all single quote marks to REM and the command *TIMER* to the number -9999. Like the other programs, a score appears at the end, and each time it is run, the program order is different.

I think you will find the flashing words to be particularly effective, especially when the correct word is substituted in the sentence.

As you can imagine, there are many other English skills we could review with our CoCo. In coming weeks, we will explore more of them. If any of you have ideas on grammar skills which could benefit from a CoCo BASIC program, drop me a line and let me know.

```
110 ..... 196
220 ....... 72
400 ...... 168
590 ...... 199
1030 .... 199
END ..... 31
```

Listing 1:

```
10 '***************************
20 '* HI-RES TRUE&FALSE QUIZ *
30 '*    BY FRED B. SCERBO    *
40 '*  COPYRIGHT  (C) 1984    *
50 '*ILLUSTRATED MEMORY BANKS*
60 '***************************
70 CLEAR700:PCLS:DIMAA$(90),X(51
),R(51),AO(50),A$(50),B$(50),C$(
50):CLS0:D=1:Y=8
80 FORI=0TO250STEP6:K=K+1:X(K)=I
:NEXT:FORP=1TO90:READC$:AA$(P)=C
$:NEXT:GOTO150
90 DATA BR2UBU2U2,BU5NDBR3D,BRUN
LU3NLNURNUNRD3NLNRD,BRUNLREHL2UR
NUR2,BR3NUBL3UE3UBL3D,BRNHRU3FND
2HLNGHERFG,BU5BRRDG,BR2HU3E,BREU
3H,BU5BRFNLNGNENRNF,BU3BR2DNLNRD
,BRUNRDRDG,BRBU2R2,BRRUL,UE3U,BR
HNE3U3ERFD3GL,R2U5NLD5R
100 DATA NR3UEREUHLG,BUFREUHNLEU
L3,BR3U5D3L3UE2R,BUFREUHL2U2R3,B
UFREUHLGU2ER,BU4UR3D2G3,BUFREUHL
NGHERFG,BRREU3HLGDFRE,BR2UBU2U,B
R2NEUBU2URDLBD3RDG,BR2H2UE2,BRBU
NR2BU2R2,BRE2UH2,BR2UBU2REHL2,,U
2NR3U2ERFD4
110 DATA U3NR2U2R2FGFDGL2,BUU3ER
FBD3GLH,U5RF2DG2L,NR3U3NR2U2R3,U
3NR2U2R3,BUU3ERBRBD3NLDGLH,U3NU2
R3NU2D3,BRU5,BUFEU4NRL2,U5D2RE2G
2F2D,NU5R3,U5FDRUED5,U5F3U3D5,U5
R3D5L3,U5R2FDGL2,BUU3ERFD3NHNFGL
H,U5R2FGL2F3,BUFREUHL2UERF
120 DATA BRU5LR3,NU5R3U5,BU5D3FD
RUEU3,NU5EU2RD2FU5,UE2H2BR3DGNLF
D2,BU5D2FRD2NLU2EU2,NR3UE3UL3,,,
,,,,U2R3U2NL2D4L3,NU5R3U4L3,NR2U
4R2,R3NU5U4L3D4,U4R3D2L3D2R3,BRU
2NLNR2U2ER,U4R3D4NL3D2L2,U4NUR2F
D3,BR2U3BU2RL2
130 DATA BR2U3BU2UBD4D2GL,NU5U3N
R2F3,RU5NLD5R2,U4FDRUED4,U4DERFD
3,U4R3D4L3,U4R3D4L3D2,U4R3D4NL3D
2,BRU4D2ER,R3U2L3U2R3,BRNR2U4NR2
NLU,NU4R3U4,BU4D2FDRUEU2,NU4EURD
FU4,UEHUBR3DGNLFD,BU4D3FR2NU4DGL
,NR3UE3L3
140 SL=LEN(W$):FORI=1TOSL:B$=MID
$(W$,I,1):C=ASC(B$)-32:DRAW CC$+
"S4BM"+STR$(X(I))+","+STR$(Y)+AA
$(C):NEXTI:RETURN
```

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SIDE ONE: Fraction Lessons, explains fractions with the aid of graphics. Child studies the different ways fractions can be represented. Lessons include:

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Many educators have praised the use of motion and color to display the fractional equivalents.

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Joystick Draw is the simple way to explore your artistic talents! Program operation is easy enough for a child to use, but effective enough that TCE uses it to design many sophisticated high-resolution graphic screens. Joystick Draw's design allows you or your child to save those masterpieces for future revisions or for use in other programs (instructions included). Your child will spend many hours enjoying this program and at the same time improving his or her eye hand coordination! You will find Joystick Draw to be an easy way to design those more sophisticated graphics for your own programs!

CoCo16 ECB . . . . Tape: $16.95

SPELL BOMBER

As captain of your ship, you must destroy the enemy bomber by spelling the mystery word. In this exciting and educational game the bomber gets closer with each inaccurate letter. You have only EIGHT tries to guess the mystery word or your ship will be bombed! If you guess the word correctly, GENERAL QUARTERS will sound and your ship will fire a missile to destroy the bomber, Three levels are available: EASY, MEDIUM, and HARD. Challenging for all ages!

Atari16K . . . . Tape: $18.95
CoCo 16k ECB . . . . Tape: $18.95 Disk: $22.95
Vic 20 13k . . . . Tape: $18.95

SPELLING BEE

The word is pronounced vocally and it is up to you to type in the correct spelling. If wrong, the computer will be your friend and flash the word on the screen for just an instant. OK! Try typing the word in again. STILL WRONG! The computer wants success and allows you to see the word again this time a little longer. If you just can't spell the word, the computer realizes you need to learn to spell the word and leaves the word on the screen for you to copy. Try your best and the computer has a surprise for your reward!

SPELLING BEE I . . . GRADE 1 & 2
SPELLING BEE II . . GRADE 3 & 4
SPELLING BEE III . . . GRADE 5 & 6
SPELLING BEE IV . . . GRADE 7 & 8

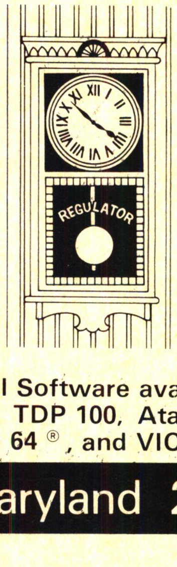
CoCo 16k ECB . . . . TAPE: $16.95 Each

TC—INVENTORY

Many insurance companies offer a discount for policy holders which have complete inventories on file. TC — Inventory is designed to help you organize, maintain, and compile the personal belongings of your home. Program is user friendly and menu driven. TC — Inventory allows input for location of item, price of item, serial number of item, date of purchase, and a text written description of the item. Don't put off recording your personal belongings until its too late. Requires printer for hard copy.

CoCo 32k ECB . . . . Tape: $16.95

TEACHING CLOCK



Torn between teaching time on a digital or a conventional (face and hands) clock? Well, this program combines the two using high resolution graphics and prompts! Your child will learn to tell time with the aid of a specially designed CLOCK! Child enters the time, if wrong, the center of the clock displays a graphic aid. If the child is correct a musical reward is heard. Program offers three levels: hours, quarter hours, and five minute intervals.

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```
150 PMODE 4,1:COLOR0,1:PCLS
160 FORJ=1TO40:READ A$(J),B$(J),
C$(J):IF A$(J)="END" THEN180
170 NEXTJ:GOSUB190:GOTO200
180 GOSUB190:GOTO200
190 COLOR0,1:LINE(0,0)-(256,32),
PSET,BF:LINE(2,2)-(253,30),PRESE
T,B:SCREEN1,0:CC$="C1":RETURN
200 W$="  TRUE AND FALSE QUIZ ON
:":Y=12:GOSUB140
210 W$="   "+B$(J):Y=24:GOSUB140:
CC$="C0"
220 W$=" SHELL PROGRAM BY FRED B
. SCERBO (C) 1984":Y=50:GOSUB140
230 W$="  PRESS <ENTER> TO BEGIN
 TAKING THE QUIZ":Y=70:GOSUB140
240 X$=INKEY$:KW=RND(-TIMER):IFX
$=CHR$(13)THEN250ELSE240
250 LINE(0,44)-(255,80),PRESET,B
F
260 J=J-1
270 FORI=1 TO J
280 AO(I)=RND(J)
290 FORK=I-1 TO 0STEP-1 :IFAO(I)
=AO(K)THEN280
300 NEXTK:NEXTI
310 FOR Y=1TO1000:NEXTY
320 COLOR0,1:LINE(4,4)-(252,28),
PSET,BF:CC$="C1"
330 W$="       Is the following T
RUE or FALSE ?":Y=18:GOSUB140:CO
LOR1,0:LINE(0,162)-(256,180),PRE
SET,BF:LINE(2,164)-(253,178),PSE
T,B:W$="      PRESS (T)RUE OR (F)
ALSE OR (S)TOP.":Y=174:GOSUB140:
CC$="C0"
340 MS$="      ":FORP=1TOJ:IFP>9TH
ENMS$="       "
350 JK$=STR$(P)+". "+A$(AO(P)):Y
=34:GOSUB360:GOTO410
360 IF LEN(JK$)<=42THEN400
370 FOR T=42TO0STEP-1:IF MID$(JK
$,T,1)=" "THEN390
380 NEXT T:GOTO400
390 L$=LEFT$(JK$,T):W$=L$:Y=Y+12
:GOSUB140:JK$=MS$+RIGHT$(JK$,(LE
N(JK$))-T):GOTO360
400 W$=JK$:Y=Y+12:GOSUB140:RETUR
N
410 G$=INKEY$:IFG$=""THEN410
420 IFG$="S"THEN540ELSEIFG$="T"T
HEN430ELSEIFG$="F"THEN430ELSE410
430 IF G$=B$(AO(P))THEN 460
440 GOTO480
450 IF C(F(G))<>AO(P) THEN480
460 W$="      --------- YOU ARE COR
RECT! ---------"
470 CR=CR+1:GOTO520
480 W$="----- WRONG! THE STATEME
NT IS "
490 IF B$(AO(P))="F" THEN W$=W$+
" FALSE. -----"
500 IF B$(AO(P))="T" THEN W$=W$+
 "TRUE. -----"
510 IR=IR+1
520 Y=Y+16:GOSUB140:JK$=MS$+C$(A
O(P)):GOSUB360:FOR Y=1TO2500:NEX
TY:COLOR1,0:LINE(0,34)-(256,160)
,PSET,BF
530 NEXTP
540 SCREEN0,0:CLS:PRINT:PRINT
550 IF CR=J THEN GOSUB650
560 PRINT"     NUMBER CORRECT = "
CR
570 PRINT
580 PRINT"     NUMBER WRONG   = "
IR:J=P-1:IF J=0 THEN J=1
590 PRINT:PRINT"     STUDENT SCOR
E  = ";INT(CR*100/J);"%"
600 PRINT:PRINT"     ANOTHER TRY
(Y/N)";
610 W$=INKEY$:IFW$=""THEN610
620 IF W$="Y" THEN RUN
630 IF W$="N" THEN END
640 GOTO610
650 REM GRAPHIC REWARD
660 RETURN
990 REM ENTER DATA AT LINE 1000
1000 DATA One of the most import
ant parts of your Color Computer
 is the CPU - which in plain Eng
lish stands for Computer Person
User.,F,"NO. CPU stands for CENT
RAL PROCESSING UNIT, NOT Compute
r Person User."
1010 DATA "The RAINBOW is not on
ly the largest Color Computer mo
nthly magazine around - it is th
e finest one that money can buy
as well.",T,"There are other Col
or Computer Magazines, but none
are as fine as The RAINBOW."
1020 DATA "When plugging in a RO
M cart, it is always wise to TUR
N OFF the Color Computer first,
and then slowly insert the cartr
idge. Otherwise, you may damage
the computer.",T,"Always turn of
f the Computer First!!!"
1030 DATA "Turning off the power
 on your Color Computer will not
 affect the memory you have in R
AM, but may affect the memory yo
u have in ROM.",F,"ROM remains u
```

```
naffected, but our RAM is lost o
n POWER-OFF."
1040 DATA "The SERIAL port of yo
ur Color Computer is used to dum
p information to a line printer,
 and does so much faster than a
PARALLEL connection would.",F,"A
 PARALLEL is much faster than a
SERIAL port."
1050 DATA "The RENUM command is
used when you wish to change the
 line numbers of your BASIC prog
ram without losing the routes ac
cessed by GOTO or GOSUB statemen
ts.",T,"RENUM does in fact work
in this way."
1060 DATA "A disk drive is faste
r than a cassette recorder becau
se the disk cable transmits BYTE
S while the cassette transmits b
y BITS.",T,"A BYTE contains eigh
t BITS, so a disk would be faste
r."
1070 DATA "BASIC is a slow, low
level programming language.",F,"
BASIC is actually a HIGH LEVEL l
anguage which is further removed
 from the computer's CPU since i
t must use the BASIC INTERPRETER
."
1080 DATA "There is no way that
two different brands of computer
 can communicate with each other
 since each might use a differen
t CPU.",F,"Two different compute
rs can communicate if you use a
MODEM and transmit in ASCII code
."
1090 DATA "A 64K Color Computer
does not really have 64,000 byte
s of RAM.",F,"There is actually
64,000 bytes. Only 32,000 is ava
ilable for BASIC, but the rest c
an be used with OS-9 or some mac
hine language programs."
5000 DATA END,Sample Test of Col
or Computer info,END
```

```
240 ....... 33
510 ...... 160
END .... 206
```

Listing 2:

```
10 '*****************************
20 '* TEXT VERS. TRUE & FALSE *
30 '*     BY FRED B.SCERBO     *
40 '*     COPYRIGHT (C) 1984    *
```

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You have been dropped off on a deserted island by a submarine. You must recover a top secret microfilm and signal the sub to pick you up. Problems abound in this 32K text adventure.
Cassette 32K EXT - Postpaid $17.95

PROGRAM FILE (Reviewed in Oct. 83 Rainbow)
Organize your cassette programs. Let your computer find that program for you. Create and maintain a four field file. You can search, sort, modify, delete and display on screen or printer. Sorting may be done by name, type or location.
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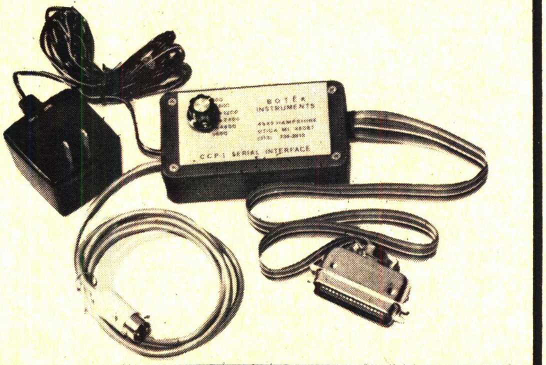
50 '******************************
60 CLEAR 2000
70 DIM AO(50),A$(50),B$(50)
80 CLS0
90 SW=30:KZ=RND(-TIMER)
100 FORJ=1TO40
110 READ A$(J),B$(J):IF A$(J)="E
ND" THEN130
120 NEXTJ
130 PRINT@32,"";
140 FORI=1TO64:PRINTCHR$(191);:N
EXT
150 PRINT:PRINT"     TRUE AND FA
LSE QUIZ ON:"
160 PRINT:PRINT:WW=INT(31-LEN(B$
(J))):PRINTTAB(WW/2);B$(J):PRINT
170 PRINT:PRINT"   BY FRED B. SC
ERBO (C) 1984":PRINT:PRINT
180 FORI=1TO64:PRINTCHR$(191);:N
EXT
190 FOR WW=1TO2000:NEXTWW
200 J=J-1
210 FORI=1 TO J
220 AO(I)=RND(J)
230 FORK=I-1 TO 0STEP-1 :IFAO(I)
=AO(K)THEN220
240 NEXTK:NEXTI
250 FOR Y=1TO1000:NEXTY
260 CLS
270 FOR P=1TOJ
280 CLS:PRINT"STATEMENT NUMBER";
P"."
290 PRINT
300 PRINT"IS THE FOLLOWING TRUE
OR FALSE?":PRINT
310 JK$=A$(AO(P))
320 IF LEN(JK$)<=SW THEN 360
330 FOR T= SW TO 0STEP-1:IF MID$
(JK$,T,1)=" "THEN350
340 NEXT T:GOTO360
350 L$=LEFT$(JK$,T):PRINT" ";L$:
JK$=RIGHT$(JK$,(LEN(JK$))-T):GOT
O320
360 PRINT" ";JK$
370 PRINT
380 PRINT"     T)RUE    OR"
390 PRINT"     F)ALSE."
400 PRINT
410 G$=INKEY$:IF G$=""THEN410
420 IF G$="T"THEN450
430 IF G$="F"THEN450
440 GOTO410
```

PARALLEL PRINTER INTERFACE

FOR THE RADIO SHACK COLOR COMPUTER



- Runs any parallel printer from the Color Computer serial I/O port.
- No hardware modifications or software patches needed. Works with all standard Color Computer commands including graphics.
- Switch selectable baud rates from 300 to 9600.
- All cables and connectors included.
- Most printers supply power at the parallel port. With these printers you may order your interface without the power module. Printers that require the power module are: Epson, Panasonic, Smith-Corona TP1, Centronics, and Mannesman Tally.
- Modem users ! You may order your Botek interface with a modem cable and switch to select between your printer and modem. Several modem connectors are available, so please tell us what modem you have.
- Price: Model CCP-1 ------ $ 69.
  Model CCP-2 -with modem cable and switch--- $ 84.
  Either model without power module deduct --- $ 3.
  Shipping costs included in price.
  Michigan residents add 4% sales tax.
- 1 year warranty.

* We carry the finest disk drive system that you can use with your Color Computer. The system includes: TEAC double sided disk drive, drive enclosure and power supply, J & M disk controller, and cable. We configure the TEAC drive so that it can be used as two single sided drives or as a double sided drive. The J & M disk controller is Radio Shack compatible ------ $ 425.

* PRINTER SPECIALS *
C-itoh Prowriter plus CCP-1 ----- $ 389.
Gemini 10X plus CCP-1 --------- $ 339.

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313 739-2910
4949 HAMPSHIRE, UTICA, MICH., 48087
HAPPY BIRTHDAY RAINBOW
Dealer inquiries invited

```
450 IF G$=B$(AO(P))THEN 480
460 GOTO500
470 IF C(F(G))<>AO(P) THEN500
480 PRINT:PRINT"YOU ARE CORRECT!
"
490 CR=CR+1:GOTO540
500 PRINT:PRINT"WRONG! THE STATE
MENT IS ";
510 IF B$(AO(P))="F" THEN PRINT"
FALSE."
520 IF B$(AO(P))="T" THEN PRINT"
TRUE."
530 IR=IR+1
540 FOR Y=1TO1000:NEXTY
550 NEXTP
560 CLS:PRINT:PRINT
570 PRINT"    NUMBER CORRECT = "
CR
580 PRINT
590 PRINT"    NUMBER WRONG   = "
IR
600 PRINT:PRINT"    STUDENT SCOR
E  = ";INT(CR*100/J);"%"
610 PRINT:PRINT"    ANOTHER TRY
(Y/N)";
620 W$=INKEY$:IF W$=""THEN620
630 IF W$="Y" THEN RUN
640 IF W$="N" THEN CLS:END
650 GOTO620
990 REM ENTER DATA AT LINE 1000
1000 DATA "THE EARTH ROTATES ON
ITS AXIS ONCE EVERY TWENTY FOUR
HOURS.",T
1010 DATA "THE AIR WE BREATHE IS
 MADE UP MOSTLY OF CARBON.",F
1020 DATA "THERE ARE SIXTY MINUT
ES IN ONE HOUR.",T
1030 DATA "COLUMBUS SAILED ON TH
E A SHIP CALLED THE MAYFLOWER.",
F
1040 DATA "THE MOON HAS ITS OWN
SOURCE OF LIGHT AND OXYGEN.",F
1050 DATA "THE SUM OF 127 AND 14
 IS 141",T
1060 DATA "GEORGE WASHINGTON WAS
 THE FIRST PRESIDENT OF THE UNIT
ED STATES.",T
1070 DATA "THERE ARE FIVE QUARTE
RS IN A DOLLAR.",F
1080 DATA "IF YOU BUY ITEMS TOTA
LLING $6.49, YOUR CHANGE FROM TE
N DOLLARS SHOULD BE $3.51 !",T
1090 DATA "ALASKA WAS THE LAST S
TATE TO ENTER THE UNITED STATES
OF AMERICA.",F
5000 DATA END,SAMPLE TEST OF ASS
ORTED DATA
```

210	241
450	82
720	191
END	64

Listing 3:

```
10 '****************************
20 '*    ENGLISH VERBS QUIZ    *
30 '*     BY FRED B.SCERBO     *
40 '*    COPYRIGHT (C) 1984    *
50 '****************************
60 CLS0:KW=RND(-TIMER)
70 CLEAR1000
80 DIM AO(50),A$(50),B$(50),C$(5
0),NP(50)
90 REM SET SENTENCE STRINGS
100 FT$(1)="FIRST WE WILL FIND T
HE PRESENT  TENSE."
110 FT$(2)="NOW LET'S SEE IF YOU
 CAN FIND   THE PAST TENSE."
120 FT$(3)="OKAY. NEXT LET'S SEE
 IF YOU CAN FIND THE PAST PARTIC
IPLE."
130 REM SET BLANK SENTENCES
140 ST$(1)="TODAY I ..... IT."
150 L$(1)="TODAY I ":R$(1)=" IT.
"
160 ST$(2)="YESTERDAY I .......
```

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Botek Interface		65.95
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Junior's Revenge (Computerware)	(32K)	26.95	29.95
Calixto Island (Mark Data)	(32K)	23.95	26.95

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		TAPE	DISK
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VIP Writer (Softlaw Corp.)	(32K)	**	55.95
VIP Database (Softlaw Corp.)	(32K)	--	55.95
VIP CALC (Softlaw Corp.)	(32K)	**	55.95

**Tape Version Included **

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Terms: Money Orders and Personal checks welcome (Please allow an additional 2 weeks for personal checks).

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NEW

PROFESSIONAL PROFESSIONAL PROFESSIONAL PROFESSIONAL

This program is the **ultimate** in coco communicating!! ***Ultra* Term +** is used with a plug-in 80 column board* that gives you **True** 80 columns, not the graphics display that is unreadable at 80 columns. This is truly a ***Professional*** Package that is so easy to use that once you have used it, you'll wonder why other packages are so difficult to use, (except for Color Term + Plus + that is!) After using a terminal program that cannot give you **True** mainframe terminal emulation, you will find ***Ultra* Term +** indispensable! ***Ultra* Term +** even has a host mode that allows you to echo characters like full duplex mainframes do! There are also 10 macro keys which will allow you to save passwords, phone numbers, modem programming information, etc. + PLUS + you can save them to disk. Also, like all ***Professional*** terminal programs you can save your current parameters. This saves you set up time when moving from one system to another. +Plus+ when used with the parallel printer port** you can print what is coming in. And what about documentation? Every feature is explained in detail and indexed for fast look up! There is also a comprehensive help section to aid those unfamiliar with telecommunications. Although this program was designed for the Professional a total novice can use it with ease. Check all the features listed below and then you decide who has the world's smartest terminal!

Baud Rates: 110-4800 (communicate)
600-9600 (printer).
Screen Format: 80 x 25 w/true upper & lower case.
Select half, full duplex or echo.
Select odd, even, mark, space or no parity.
Send all 128 characters from keyboard.
Select 7 or 8 bit words.
Select 1 or 2 stop bits.
Send a true line break.
Select all caps if needed.
Automatic capture of incoming files.
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Merge text or programs in buffer.
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Send and receive BASIC, FILES and machine code.
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Selectable trapping of incoming characters.
Print while receiving data*.
Buffer editor has these features:
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Block deletion or start to end of buffer delete.
Save and load macros.
Save and load parameters.
Use 1-4 disk drive (w/SAVE, LOAD, DIR. & granule display).
Easy to use MENU driven format.
Comprehensive users manual.
Works with **ALL** Radio Shack™ Disk Systems and **all** models of color computers.

Still not convinced? How about a 15 day, money back guarantee? If you don't like the package for any reason, we will refund your money upon return of a like-new package.† Who out there is offering you this kind of deal? And customer support was never better. Simply fill out your registration card and send it back to us and you will be notified when new features, improvements, etc. become available because all registered owners will receive **Free** upgrades for a $5.00 shipping and handling fee).

As with all good Professional programs, ***Ultra* Term +** is **all machine code.** This program has been tested by those both familiar and unfamiliar with communications programs. And when you call for some technical support, you **won't** get an answering machine during our business hours (10-5 CST M-Sat.) under normal circumstances. Technical help is usually available all day.

PRICE: *Ultra* Term + — $55.95 (Disk)
Word·Pak (80-column board; includes a software driver so you can use your basic programs with no modification in most cases!). . . . **$139.95** + $3.00 S&H
Y-Cable...**$29.95** (Required if expansion port not used with disk drives)
Complete Package ***Ultra* Term +**, Word·Pak & Y Cable [subtract $20.00 if not needed] is only **$210.00**

*****Ultra* Term +** supports the 80 column board made by PBJ, Inc. If you already have the board, simply order the program, but those of you who don't can get a good deal.

**Parallel Printer Port from PBJ, Inc.

†Less $10.00 restocking charge.

DOUBLE SPOOLER

Tired of waiting for your listings? printouts? etc.? This is THE Spooling Program!! No need to save your programs in ASCII. You can also spool your files and you can spool **ANYTHING** you print on the screen while a program is running! Requires a minimum of 32K **AND** the 64K computer can spool really **LARGE** files!! Plus more!!
PRICE: $19.95 (Tape) $21.95 (Disk)

DOUBLE SWITCH

Now you can switch between two different devices **AND** you get an on/off indicator at the same time. Switch your **Modem & Printer** or two printers, etc.
PRICE: $29.95

DOUBLE CABLE

Tired of switching cables everytime you use your modem and printer? This is the fix!! Hook your modem and printer up at the same time! No more switching.
PRICE: $14.95

COLOR DISK SAVER

Disk bombed again? Can't really afford those expensive programs that might fix your disk? Anyone can afford the price of this program. **COLOR DISK SAVER** will save your sanity, as well as your disk. Don't wait until it is too late, or spend hours trying to fix the disk! **COLOR DISK SAVER** will save your disk to tape, reload the tape to disk if you ever need to restore the disk. It also has a tape verify command! Don't delay! 32K Required
PRICE: $12.95 (Tape)

AUTOLOAD

AUTOLOAD II will load most any tape program, machine code or basic, and put it on disk for you automatically!! **AUTOLOAD II** will skip programs with errors and go on to the next program, either automatically or it will stop and wait for instructions. **AUTOLOAD II** will also allow you to fix machine language programs that crash when used with a disk. You will no longer have to remove the disk controller before playing a game. Everything is done while you watch. Works great on **RAINBOW** on tape, and other similar items. Requires 16K minimum systems.
PRICE: $12.95 (Tape)

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At last a powerful, easy to use, mailing list program for a reasonable price. Up to 200 names can be held in memory for you to change, modify, search or print as you like. Plus, you can print out up to 1800 names without touching the keyboard. Save **thousands** of names on each disk. The machine language sort routine will sort 200 names in as little as 6 seconds! Supports single or double wide labels. Three and four line labels can be intermixed without leaving gaps in your listings! All menu driven, and easy to use. Printer support gives 600-9600 **BAUD** selection, and different print sizes if you wish. 16K Extended

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Compare these features with ***any*** other terminal program:

32 × 16, 42, 51, 6 × 24 Screen
Communications BAUD Rate: 110-19200
Printer Baud Rate: 600-9600
Select Half or Full Duplex.
Select Odd, Even, or no Parity.
Select 7 or 8 Bit Words.
Send Control Characters.
Send a True Line Break.
Separate Keys for Escape and Rubout.
Select All Caps If Needed.
Word Wrap — Eliminate Split Words. (32 Character Mode)
Selectable Reverse or Normal Video. (32 Character Mode)

NOW WITH 42, 51 OR 64 CHARACTERS BY 24 LINES!

Scroll Protect Up to 9 Lines.
Automatic Capture of Incoming Files, Send One Line At a Time From Your Buffer.
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*Disk and Rom Pack only (not on tape). PRICE: $29.95 (TAPE) $39.95 (ROM PACK) $39.95 (DISK)

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NEW AND IMPROVED!! Double Dos II is an enhanced version of our original **DOUBLE DOS** program. The original Double Dos was so well received that we decided to add even more capabilities, and fix some of the limitations in the original program. With Double Dos you can use 35, 40 or 80 track (double and single sided) drives all on one system, all at the same time. (The use of double sided drives will limit you to three drives.) Works with all types of 5¼ or 3 inch drive systems and All commands are supported in Double Dos! Double Dos is totally transparent to your basic programs! If your system selection is 80 tracks, a **FREE** command will return 158 granules! Compare this to the 68 granules your system now returns. You get 78 granules with a 40 track drive, 10 more than the 35 track system. **EVERY** command in basic is supported by Double Dos. There is only one limitation, you can only open any number of files to one drive at a time, otherwise everything else is the same. Plus you get some great new commands!! Look at what Double Dos will allow as new disk basic commands:

BAUD 1-6 ... change the **BAUD** rate with a command, no pokes!
TRACK 35,36,40,80 ... change the number of tracks.
DOUBLE ... enable the double sided option.
PDIR ... print your directory to the printer.
DUMP ON/OFF ... send a basic program to a friend without using a terminal program!
RATE 6,35 ... change the head stepping rate.
VIDEO ON/OFF ... will give you a reverse screen without a hardware modification.
SCROLL 1-255 ... change the screen scrolling speed.
COMMAND ... will list all new commands.
DUPE 0-2 ... will allow copy & backup from one side of a disk to the other side on double sided systems!
DATE ... you can enter the month, day, and year which will be stored in the directory of your disk each time you save a program or file, and you can see it when you use the DIR command! Very useful when looking for the most current file or program!

AND, all commands can be used inside basic programs because they have been added to disk basics list of commands! You also get full reset protection, which means that you will stay in the 64K mode until you power-down.

PRICE: $29.95 (DISK ONLY) 64K Required

Help Us Battle the High Cost of Disk Drives

NOW . . .
V-PRINT
A utility to print
directory on paper
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PROGRAMS
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Un-DISK Drives $49.95?

You Bet! There are empty spaces in your 32K and 64K CoCo. The Preble VDOS Un-DISK helps you fill them up with PROGRAMS!

- Un-DISK uses your computer's extra memory like a fast disk drive.
- Un-DISK can store BASIC and MACHINE LANGUAGE programs.
- Un-DISK is INVISIBLE. Yup! Un-DISK does not interfere with normal Color Computer Operation.
- Un-DISK appears only when you type the magic word VDOS.
- Un-DISK comes with comprehensive instructions which you may not need because:
- Un-DISK is self-prompting and easy to use!
- Un-DISK is provided on cassette.
- Un-DISK is faster than a slow clumsy DISK DRIVE and best of all . . .
- Un-DISK is CHEAPER than a DISK DRIVE!
- Un-DISK will work even if you already own a disk but WHY BUY A DISK AT ALL?
- Un-DISK should be in the library of every serious CoCo user even if you own a disk says Frank J. Esser, independent reviewer for RAINBOW Magazine!

OK sure, disk drives ARE NICE. I own one. But if your finances are limited, the Un-DISK can give you much of the power of the mechanical drive. Even if you already own a disk the Un-DISK can work like a super fast extra disk.

EXTRA . . . EXTRA . . . EXTRA . . . EXTRA . . .
Additional Power For $14.95

Only with VDUMP for the Un-DISK!

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or $5.00 to other foreign points	

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```
IT."
170 L$(2)="YESTERDAY I ":R$(2)="
 IT."
180 ST$(3)="I HAVE ....... IT BE
FORE."
190 L$(3)="I HAVE ":R$(3)=" IT B
EFORE."
200 REM READ DATA
210 FORJ=1TO50
220 READ A$(J),B$(J),C$(J):IF A$
(J)="END" THEN240
230 NEXTJ
240 PRINT@32,"";
250 FORI=1TO64:PRINTCHR$(255);:N
EXT
260 PRINT:PRINT"    ENGLISH GRAM
MAR QUIZ ON:"
270 PRINT:PRINTTAB(8)"IRREGULAR
VERBS":PRINT:WW=INT(31-LEN(B$(J)
)):PRINTTAB(WW/2);B$(J)
280 PRINT:PRINT"    BY FRED B. SC
ERBO (C) 1984":PRINT
290 FORI=1TO64:PRINTCHR$(255);:N
EXT
300 FOR WW=1TO2000:NEXTWW
310 J=J-1
320 REM RESORT ORDER OF DATA
330 FORI=1 TO J
340 AO(I)=RND(J)
350 IF NP(AO(I))=1 THEN 340
360 NP(AO(I))=1:NEXT I
370 FOR Y=1TO2000:NEXTY:GOTO390
380 REM START WORKING LOOP
390 FOR P=1TOJ
400 CLS
410 REM SORT VERBS
420 FOR E=1TO3
430 F(E)=RND(3)
440 FOR K=E-1 TO 0 STEP-1:IF F(K
)=F(E) THEN430
450 NEXTK:NEXTE
460 GOSUB470:GOTO560
470 CLS:PRINT"HERE ARE YOUR THRE
E CHOICES:":PRINT
480 G$(F(1))=A$(AO(P))
490 G$(F(2))=B$(AO(P))
500 G$(F(3))=C$(AO(P))
510 PRINTTAB(4)"A) ";G$(1)
520 PRINTTAB(4)"B) ";G$(2)
530 PRINTTAB(4)"C) ";G$(3)
540 RETURN
550 REM TRY ALL THREE VERBS
560 FOR TV=1TO3:PRINT
570 PRINT@192,FT$(TV)
580 PRINT
590 PRINT"WHICH LETTER WILL CORR
ECTLY     COMPLETE THIS SENTENCE
?"
600 PRINT:PRINT ST$(TV)
610 FL$="":FL=LEN(G$(F(TV))):FOR
 W=1TO FL:Q=ASC(MID$(G$(F(TV)),W
,1))+32:FL$=FL$+CHR$(Q):NEXT W
620 G$=INKEY$:IFG$=""THEN620
630 IF ASC(G$)=64+F(TV)THEN680
640 IF ASC(G$)<65THEN620
650 IF ASC(G$)>67THEN620
660 GOTO730
670 REM CORRECT SECTION
680 CR=CR+1:PRINT:PRINT"THAT IS
CORRECT!"
690 FOR YY=1 TO 20:PRINT@384,L$(
TV);G$(F(TV));R$(TV):FOR WA=1TO1
00:NEXT WA
700 PRINT@384,L$(TV);FL$;R$(TV):
FOR WA=1TO100:NEXT WA:NEXT YY
710 GOTO750
720 REM WRONG SECTION
730 R=ASC(G$)-64:IF G$(F(TV))=G$
(R)THEN680
740 IR=IR+1:PRINT:PRINT"WRONG! Y
OU PICKED CHOICE ";G$;".":GOTO69
0
750 IF TV=3 THEN 770
760 GOSUB470
770 NEXT TV:NEXT P
780 REM SCORING SECTION
790 CLS:PRINT:PRINT
800 PRINT"    NUMBER CORRECT = "
CR
810 PRINT
820 PRINT"    NUMBER WRONG   = "
IR
830 J=CR+IR
840 PRINT:PRINT"    STUDENT SCOR
E  = ";INT(CR*100/J);"%"
850 PRINT:PRINT"    ANOTHER TRY
(Y/N)";
860 W$=INKEY$:IFW$=""THEN860
870 IF W$="Y" THEN RUN
880 IF W$="N" THEN 900
890 GOTO860
900 CLS:END
990 REM ENTER DATA AT LINE 1000
1000 DATA DO,DID,DONE
1010 DATA EAT,ATE,EATEN
1020 DATA SING,SANG,SUNG
1030 DATA BRING,BROUGHT,BROUGHT
1040 DATA CHOOSE,CHOSE,CHOSEN
1050 DATA KNOW,KNEW,KNOWN
1060 DATA THROW,THREW,THROWN
1070 DATA WEAR,WORE,WORN
1080 DATA WRITE,WROTE,WRITTEN
1090 DATA SPRING,SPRANG,SPRUNG
5000 DATA END,SECTION ONE,END
```

16K
ECB

CASSLABL: A Music Tape Organizer

By Brad Scoffin

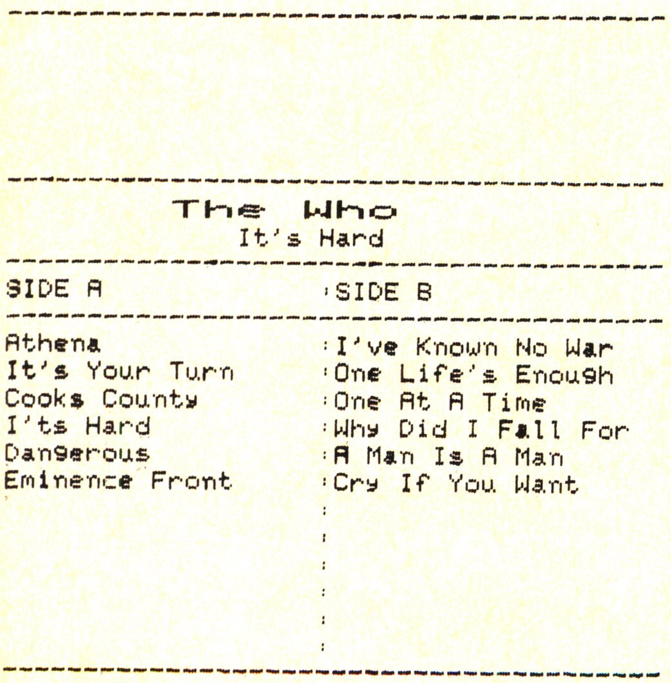
This is a short 25-line program I wrote one morning after I had cleaned out my desk and decided to re-organize my music cassettes. The program requires 16K ECB and the Radio Shack Line Printer VII, DMP-100 and TDP line Printer 1.

CASSLABL starts off by asking for the name of the group or singer, the name of the album, and the names of the songs on side A and B. The length of each song title must not exceed 19 characters.

The program then prints out a label for the cassette, which must be cut and folded to fit between the old card and the cassette case. To make the label fit, cut the paper just above the first line and just below the last line. Trim the sides so it fits in the case and fold it so that the name of the group shows on the side of your cassette.

I hope this program is as useful to you as it was to me; it has really cleaned up the appearance of my cassette case. To make duplicate copies of a label, change Line 25 from *RUN* to read *GOTO 17*.

Editor's Note: To use other printers, substitute your printer's codes for double-width printing in place of the *CHR$(31)* (on) and *CHR$(30)* (off) in Line 19.



```
----------------------------------------




----------------------------------------
            The Who
            It's Hard
----------------------------------------
SIDE A             :SIDE B
----------------------------------------
Athena             :I've Known No War
It's Your Turn     :One Life's Enough
Cooks County       :One At A Time
I'ts Hard          :Why Did I Fall For
Dangerous          :A Man Is A Man
Eminence Front     :Cry If You Want
                   :
                   :
                   :
                   :
                   :
                   :
----------------------------------------
```

14 74
END 248

The listing:

```
1 CLEAR500:DIMA$(12),B$(12):CLS
2 INPUT"GROUP NAME (MAX 19 CHARS
.)        ";GP$:IFLEN(GP$)>19THENG
P$=LEFT$(GP$,19)
3 INPUT"ALBUM NAME (MAX 38 CHARS
.)        ";AN$:IFLEN(AN$)>38THENA
N$=LEFT$(AN$,38)
4 CLS:PRINT@10,"SIDE A"
5 FOR I=1TO10
6 PRINTI;:INPUTA$(I)
7 IF A$(I)=""THEN8ELSENEXTI
8 CLS:PRINT@10,"SIDE B"
9 FORI=1TO12
10 PRINTI;:INPUTB$(I)
11 IF B$(I)=""THEN12ELSENEXTI
12 CLS:PRINT@10,GP$:PRINT@42,AN$
```

```
:PRINT:PRINT"SIDE A","SIDE B"
13 FORI=1TO12
14 IF LEN(A$(I))>15THENPA$=LEFT$
(A$(I),15)ELSEPA$=A$(I)
15 IF LEN(B$(I))>15THENPB$=LEFT$
(B$(I),15)ELSEPB$=B$(I)
16 PRINTPA$,PB$:NEXTI
17 INPUT" PRESS ENTER TO PRINT A
 LABEL";N
18 PRINT#-2,STRING$(40,"-"):FORI
=1TO5:PRINT#-2:NEXTI
19 PRINT#-2,STRING$(40,"-"):PRIN
T#-2,CHR$(31);TAB(INT((20-LEN(GP
$))/2));GP$:PRINT#-2,CHR$(30);TA
B(INT((40-LEN(AN$))/2));AN$:PRIN
T#-2,STRING$(40,"-")
22 PRINT#-2,"SIDE A";TAB(19);":S
IDE B":PRINT#-2,STRING$(40,"-")
23 FORI=1TO12:PRINT#-2,A$(I);TAB
(19);":";B$(I):NEXTI
24 PRINT#-2,STRING$(40,"-")
25 RUN
```

PRINT #-2,

(continued from Page 14)

Anniversaries also mark a turning point, of sorts, for anyone or thing, and THE RAINBOW is certainly no exception. Some of the changes you will see in this month's issue, while others will be cropping up in the months ahead. We hope that you will be pleased with what you see and that they will make your reading of what many of you tell us in the Number One CoCo magazine more enjoyable.

Though Bill Nolan has ended his "Dragon's Byte" column, he begins a new series on direct access disk files this month. Tom Nelson. he and we feel, has pretty much covered the waterfront on the subject of law and computers and, thus, ended his "CoCo Counsel" column last month, but we hope to have more from him on these pages.

You will note, though, that we add a column on PASCAL by Dan Eastham. Next to BASIC, PASCAL is probably the most widely-used microcomputer language and we believe it is time that we gave it some support. Dan has written a PASCAL implementation for CoCo and is abundantly qualified to explain it all to all of us.

I also call your attention to "Earth To Ed," our new question-and-answer column by Ed Ellers. And Fred Scerbo's "Rainbow Wishing Well" is, indeed, the only feature I know of in any magazine where you can write in and have a program written especially for your request.

Other changes that you will be seeing involve more features, additional typography implementations that should make the magazine even more easy to read and some other things. We believe here that the world of the CoCo is virtually unlimited, and we are always looking for ways to serve you better — be it something off the wall like Scratch And Sniff Adventure or practical, such as a column on PASCAL.

As always, we would like to have your suggestions and your support. THE RAINBOW was the first Color Computer *monthly* magazine (*Color Computer News* was initially a bimonthly.). Also, THE RAINBOW is by far the largest and most comprehensive; and we can only continue to be the resource we have been with your help and support. So, please, let us know what you think about anything (or everything) we are doing. And thank you for all the support you've given us the past year. If you will continue — by mentioning our name when you order products from advertisers, by telling your friends about us, by sending us your submissions and contest entries — we will do our best to continue to provide you with the kind of magazine you want.

After all, this whole enterprise began as a method to exchange ideas and that is how we want it to continue. I know I talk a great deal on these pages about "CoCo Community," but I happen to believe it is a real force and that the Color Computer is special. So are the people who own and use it — and I believe you deserve our best efforts all of the time.

So, as this publishing year ends and a new one begins, I thank each of you for your support of THE RAINBOW this past year. It has been the single most reason that we have been able to be as successful as we have. Let me know any time we can help in any way. We're here to do whatever we can to make the concept of CoCo Community a reality.

It would be totally unfitting were I to close this anniversary column without saying thank you to a number of individuals who have been an important part of the CoCo Community this past year. Some of them contributed as sounding boards, others as idea-people, others as critics. For whatever reason, it is appropriate for me to say thank you to Bob Rosen, Gordon Monnier, Arnie Weiss, Susan and Gary Davis, Dick White, Paul and Sue Searby, Barry Thompson, Ron and Mona Krebs, Joe and Barbara Bennett, Tom "that's my real name" Mix, Dennis Derringer, John Burnam, Mark Yamagata, Steve and Cheryl Blyn, Dave Lagerquist, John Ross, John Waclo, Bob Amos, Guy and Pat Endicott, Richard and Arlene Don, Frank Hogg, Tom Kelly, Linda and John Nielsen, Ken and Jeanne Kaplan, Susan and Paul Petrocci, Larry and Margaret Preble, Ed Juge, Van Chandler, Larry Reitz, Carl Shell, Terry Haas, Tom and Dan Nelson, Pete Stark, John Boals, Ted Hasenstaub, Tom Scott, Paul Nanos, Wayne Diercks, Jan Zucker, Don Dollberg, Eric Tilenius, H. Allen Curtis, Fred Scerbo, Paul Hoffman, Mike Himowitz, Jorge Mir, Larry Konecky, Bob Russell, Sandy Trevor, John "Crazy" Fraysse, Thomas Szlucha, Bob Albrecht, Tony DiStefano, Don Inman, Joseph Kolar, Dennis and Rosanne Lewandowski, Bill and Sara Nolan, Dale Peterson, Michael Plog, Fred Crawford, Charles Roslund, Robert Frowenfeld, Sherry Zuehlke, Rich Parry, Roger Schrag, Dan Burress, Bob Delbourgo and his family, Frank Brandon, Amy Arutt, Jack Knott, Jack Torres, Melvin Hefter, Geoff Wells, Tom Delker, Tom Rosenbaum, Gerry Alexander, Pat Jones, Doris and Bill Vergona, Russell Roberts, and Howard Cohen.

And yes, the entire staff at THE RAINBOW. It wouldn't be fair to forget any one of them. They are the people who get your subscriptions in the mail, who edit the articles and check the listings, who do the artwork, make sure the bills are paid and plan the RAINBOWfests. I won't take up space here by mentioning them all, but I thank them all for helping me every day of the last year.

But, as I said earlier, the real thanks goes to you. Thank you for your help, support and all that goes along with it. We simply want to publish a magazine of which you can be proud.

I think we do and you are.

— Lonnie Falk

TURN OF THE SCREW

Dualing Cassettes

By Tony DiStefano
RAINBOW Contributing Editor

I got the idea for this month's article from someone who gave me a call on a Monday night. He was working on a project that would control the motors of two cassette players and was having some problems with it. We spoke for a while, but I could not figure out what his problem was over the phone. I told him that I would put together one and present it in one of my articles. There is one thing — I cannot for the life of me remember his name. You know who you are, so give me a call and I'll give you credit for this idea.

First we must describe what this project is and what it does. It is what I call a Dual Cassette Controller, which fits in a small ROM pack, and plugs into the CoCo or CoCo 2 expansion port. It has three DIN connectors. One plug fits into your cassette connector in the back of the computer. The other two connectors connect to two tape recorders. This Dual Cassette Controller will enable the user to transfer files from one cassette to another. This could be useful in making backup copies of your software a lot easier than with one cassette. With the proper software, it could allow you to make complete backups of everything on one cassette to another. It could also be useful when sorting or changing ASCII text files. An example would be if you have a telephone list, and someone changed his or her address or telephone number, it would be easier with two cassette recorders to update the file. The next few paragraphs will show you how to build and operate the Dual Cassette Controller.

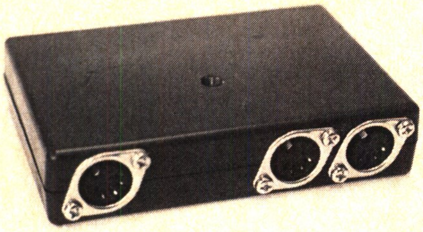
The first thing to do in this project is to get the parts and tools necessary to construct the Controller. You will find a parts list later on in this article. The tools you will need this time are the "standard tool kit," drill, round file and a sharp knife.

This project is just as much electronic as it is mechanic. It involves cutting, drilling and filing things into shape. It is up to you to make it as nice as you can or want. Halfway into building it I thought of mounting the whole thing inside the computer. Then I thought there are always many ways of modifing your computer to suit your needs. Do it the way you please. I included a few photos to show you how I built my proto-type. You can do it the same way or come up with your own design. However the mechanics are done, the electronics are the same.

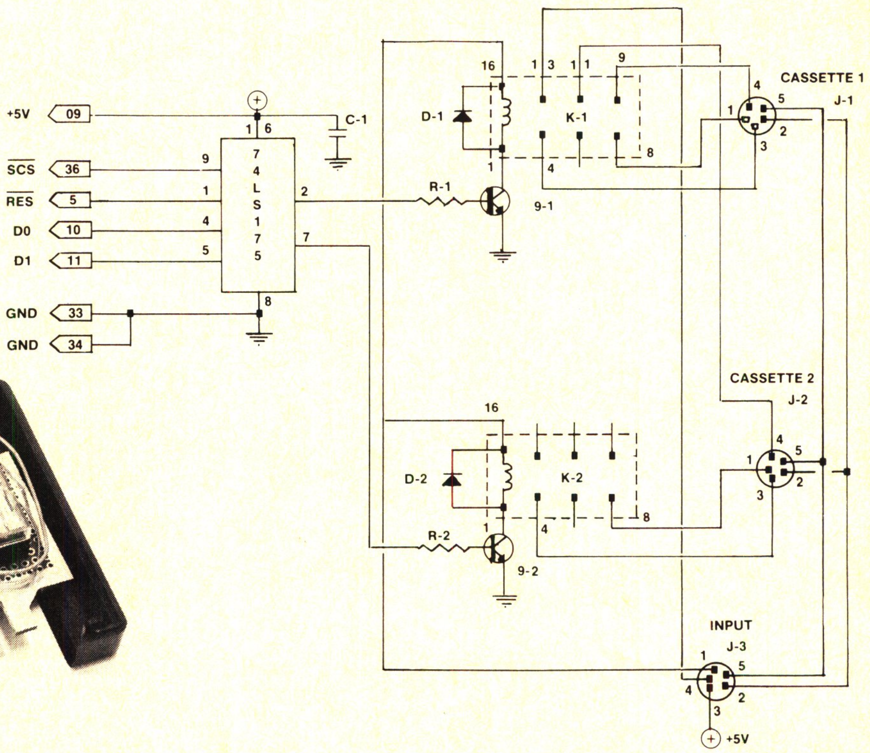
Following the schematic, solder all the components together. If you want the thing to fit in a ROM pack case, place the components as shown in the photos. Also, do not use sockets for the relays, it won't fit in the case. From past experiences, there seems to be a difference in Radio Shack part numbers in Canada and the U.S. Some numbers do not always match, so be careful. When you are not sure, use the description to get the part. Use at least a 24-gauge wire for the connections to and from the relays that connect to the motor connections on all the connectors. There are no surprises in the circuit, it is quite simple, only the regular care for static sensitive IC's will do. Remember to clean the PCB when you are finished.

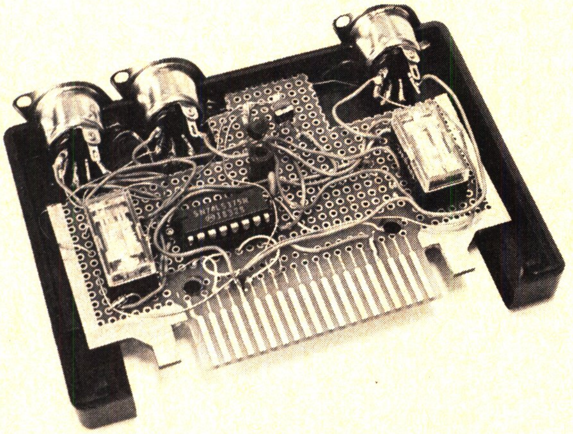
(Tony DiStefano is well known as an early specialist in Color Computer hardware projects. He is one of the acknowledged experts on the "insides" of CoCo.)

In the "Turn Of The Screw" column by Tony DiStefano in our June 1984 issue, we stated that the schematic of the Spectrum Voice Pak was supplied courtesy of Spectrum Projects. We should add that the schematic is copyrighted by John Kelty of Kelty Engineering.



DUAL CASSETTE CONTROLLER





Mount the three connectors on the end of the case. Drill, cut and file the plastic case until they fit. Then cut the PCB until it fits in the case. Make sure that no wires touch together and all solder joints are solid. Use my photos as a guide.

To try out the controller, follow these simple steps. Turn off the computer. Plug the controller into the computer slot. Plug one end of the DIN to DIN wire into the computer's cassette port. Connect the other end into the controller's input and connect the two cassette recorders into the proper connectors on the controller. Next, turn on the computer. In order to test the relays, type this in:

MOTOR ON ENTER

The internal relay should click on.

POKE 65344,1 ENTER

Parts List

ID #	Description	RS Part #
U1	74LS175	N/A
R1,R2	470 ohm ¼w	271-1317
J1,J2,J3	5-Pin DIN Female	274-005
Q1,Q2	2N3904	276-2016
K1,K2	5V Relay DPDT	271-215
D1,D2	1N4004	276-1103
C1	.1uf 10V	272-111
MISC	Proto-board	N/A
	Case	N/A
	16-Pin Socket	276-1998
	5-Pin to 5-Pin wire	42-2151

Relay number 1 should click on.

POKE 65344,0 ENTER

Relay number 1 should click off.

POKE 65344,2 ENTER

Relay number 2 should click on.

POKE 65344,3 ENTER

Both relays should be on. If all this works then the relays work okay. Now try to *CSAVE* and *CLOAD* to each cassette. To access the first cassette you must first:

POKE 65344,1 ENTER

Then all I/O will be through cassette number one. If you want to access cassette number two you must first:

POKE 65344,2 ENTER

That will give you access to the second cassette. *CSAVEs* and *CLOADs* will be done through this cassette. There is one more interesting thing with this controller. If you *POKE 65344,3* and ENTER, you will be able to *CSAVE* to both cassettes. Since both motors are on and the output goes to both recorders, you will get two copies of whatever you *CSAVEd* or *CSAVEMd*. This will not, however work with *CLOADs* because the inputs are switched. With some good machine language code, a user could open two cassette files say, *OPEN "O", #-3, "FILENAME"*. If you want to know where I got that proto-board and case, it was from Micro R.G.S. It is a great proto-board and suits CoCo projects quite well.

RAINBOW

Give us your best: Join the ranks of these courageous CoCoists in showing the Color Computer world your high score at your favorite micro-diversion. We want to put your best effort on record in THE RAINBOW's Scoreboard column. All entries must be received by the first of the month to be eligible for the following month's Scoreboard. They must include your *full* name, address, game title, company name and, of course, your high score. Each individual is limited to three score entries per month. Send your entries to Scoreboard, c/o THE RAINBOW.

★ **New Number One** ● **Last Month's Number One**

ADVENTURE *(Flex)*
65 ★Bryan Teel, Martintown, Ontario

ALCATRAZ II *(Spectral Associates)*
16,230 ★Steve Manderschied, Cincinnati, OH

ASSAULT *(MichTron)*
2,520 ★Laura Sandman, Louisville, KY

ASTRO BLAST *(Mark Data)*
158,000 ★Larry Plaxton, Medley, Alberta
157,000 Scott Drake, Pine City, NY
104,464 Jim Baker, Florissant, MO
98,000 Tim Warr, Bellingham, WA
97,000 Bernard Parent, Ste-Foy, Quebec

BAG-IT-MAN *(Aardvark)*
101,400 ★Daniel Belisle, Montreal, Quebec

BASEBALL *(Radio Shack)*
169-0 ★Rene Belisle, Montreal, Quebec
107-0 ●Glenn Wasson, Castleton, NY
100-0 Glen Giacomelli, Woodbridge, Ontario
89-0 Michael White, Hemet, CA
89-0 Daniel Belisle, Montreal, Quebec
83-0 Douglas Theiler, Dix Hills, NY
75-0 Wayne Shepherd, Louisville, KY
64-0 Danny McMahon, Louisville, KY
54-0 Salvatore Siclari, Staten Island, NY
43-2 Robert Harmon, Virginia Beach, VA
37-0 John Bena, Brookpark, OH
36-2 Bobby Hoffman, Clinton, NJ

BEAM RIDER *(Spectral Associates)*
178,270 ★David Lazar, Englishtown, NJ

BERSERK *(Mark Data)*
24,600 ★Chip Lilley, Finleyville, PA
8,500 Mark Wooge, Omaha, NE
7,900 Martin Careau, Quebec City, Quebec
7,650 David Garozzo, Morrisville, PA
7,100 Scott Calberg, Hilton, NY

BLACKJACK *(Radio Shack)*
11,820 ★Woody Farmer, Acme, Alberta

BLOC HEAD *(Computerware)*
1,006,200 ★Lindi Wolf, Fairbanks, AK
999,825 Brian Spek, Keswick, Ontario
819,425 Keith Denhoed, Coalhurst, Alberta
781,350 Joe Golkosky, Portage, MI
395,175 Jeff Roberg, Winfield, KS

BUSTOUT *(Radio Shack)*
42,000 ★Derrick Kardos, Colonia, NJ
42,000 ★Martin Klein, Skokie, IL
34,700 Sara Hennessey, Golden Valley, MN
28,720 Perry Denton, New Baden, IL
27,880 Mike Wells, Pittsburgh, PA

BUZZARD BAIT *(Tom Mix)*
2,902,700 ★Michael Popovich, Nashua, NH
2,087,650 Edmund Greene, Nashua, NH
1,134,600 Richard Buttermore, Grand Rapids, MI
756,550 Andrew Truesdale, Ferguson, MO
688,550 David Casterson, Livermore, CA
507,300 Brian Manderschied, Cincinnati, OH
417,700 Steve Manderschied, Cincinnati, OH

CANYON CLIMBER *(Radio Shack)*
8,990,000 ★Glen Giacomelli, Woodbridge, Ontario
1,571,300 ●Jeff Weaver, Gordonville, PA
1,400,200 James Stevenson, Marshall, TX
999,900 Andre Wagner, Bangor, PA
615,500 Randy Hankins, Tabor, FL

CASHMAN *(MichTron)*
$19,650 ★Perry Denton, New Baden, IL
$16,000 Scott Oberholtzer
$11,130 Ricky Susfalk, Grand Island, NY
$10,000 Tim Brown, Clio, MI

CHAMELEON *(Computerware)*
15,100 ★Janell Stroshane, Ashland, WI

CHOPPER STRIKE *(MichTron)*
67,900 ★Matt McCann, Louisville, KY
63,000 ●Andrew Figel, Sardis, OH
47,400 David Figel, Sardis, OH
42,100 Brian Peterson, Muskegon, MI

CLOWNS & BALLOONS *(Radio Shack)*
110,475 ★Andrew Truesdale, Ferguson, MO
92,480 Martin Careau, Quebec City, Quebec
89,430 Perry Denton, New Baden, IL
88,900 Cheryl Pratt, Moab, UT
85,680 Teresa Stutsman, N. Little Rock, AR

COLOR OUTHOUSE *(MichTron)*
528,694 ★Benjamin Hebb, Bridgewater, Nova Scotia
160,200 ●David Lazar, Englishtown, NJ
101,650 Davey Devlin, Clyde, NC
69,848 Phillip Laurell, Lansing, MI
48,663 Bruce March, Barrie, Ontario

COLORPEDE *(Intracolor)*
10,001,051 ★Mark Smith, Santa Ana, CA
3,355,248 Scott Drake, Pine City, NY
2,614,230 Jerry Petkash, Warren, MI
2,547,299 Rich McGervey, Morgantown, WV
2,471,342 Vincent Lok, Ontario, Canada
195,027 Shane McClure, Omaha, NE

CRASH *(Tom Mix)*
155,000 ★David Lazar, Englishtown, NJ

CU*BER *(Tom Mix)*
196,090 ★Randall F. Edwards, Dunlap, KS
94,940 Martin C. Klein, Skokie, IL
49,510 Doug Kleir, Grand Rapids, MI
42,850 Mike Schwartz, Otsego, MI
38,180 Kevin Schwartz, Otsego, MI

CUBIX *(Spectral Associates)*
67,400 ★Patricia Lau, York, PA
45,056 ●Bonnie Kretschmer, Oxford, OH
38,500 Randall Edwards, Dunlap, KS
28,760 Michael Rosenberg, Prestonsburg, KY
27,780 Britt Landrum, Pensacola, FL

DEFENSE *(Spectral Associates)*
103,660 ★Mary A. Brickles, Allen Park, MI

DESERT GOLF *(Spectral Associates)*
31 ★Kenton Fifield, Fort Francis, Ontario

DEVIL ASSAULT *(Tom Mix)*
1,294,300 ★John Statham, Strathroy, Ontario
294,300 Chip Lilley, Finleyville, PA
289,300 Michael Rosenberg, Prestonsburg, KY
271,106 Peter Niessen, Carlisle, MA
47,500 Jeffrey M. Siebert, Palm Bay, FL

DOODLE BUG *(Computerware)*
2,577,515 ★Tim Brown, Clio, MI
1,767,630 ●Perry Denton, New Baden, IL
1,180,340 Eiko Cary, National City, CA
109,660 Byron Albertson, Williams Lake, British Columbia

DOUBLE BACK *(Radio Shack)*
1,125,000 ★Mark Hurst, Sheridan, OR
1,080,000 Phillipe Duplanties, St. Jerome, Quebec
605,890 Peter Sherburne, Highland, CA
474,040 Paul Moritz, Butte, MT
435,570 Phillippe Morsan, St. Jerome, Quebec

DUNKEY MUNKEY *(Intellectronics)*
1,015,000 ★Kyle Keller, Overland Park, KS

EL BANDITO *(Mark Data)*
955 ★Michael Rosenburg, Prestonsburg, KY

ELECTRON *(Tom Mix)*
45,510 ★John Sandberg, Concord, CA
41,750 Michael Rosenberg, Prestonsburg, KY
22,990 Alan Morris, Chicopee, MA
19,500 Robby Presson, Florissant, MO

FIRE COPTER *(Adventure International)*
78,860 ★Woody Farmer, Acme, Alberta

FLYBY *(Chromasette)*
104,980 ★David Finberg, Annandale, VA
28,910 Ron Suedersky, Universal City, TX
20,110 Rick Mansell, Calgary, Alberta
16,670 Michael Rhattigan, Cory, NC
4,830 Jeff Roberg, Winfield, KS

FOOTBALL *(Radio Shack)*
217-0 ★Glen Giacomelli, Woodbridge, Ontario

THE FROG *(Tom Mix)*
452,800 ★James Baker, Salt Lake City, UT
118,200 Ray Boyko, Whitby, Ontario
109.500 ●Pat Craddick, Janesville, WI
95,790 Eileen Kaakee, Royal Oak, MI
68,850 Scott Kubota, Whitby, Ontario

FROGGIE *(Spectral Associates)*
84,440 ★Bill Ide, Newark, DE
74,050 ●Mike Garozzo, Morrisville, PA
68,680 Carmen Thew, Surrey, British Columbia

GALAGON *(Spectral Associates)*
286,741 ★Rod Moore, Fork Union, VA
188,130 Daryl Judd, Nampa, ID
136,510 Mike Ashworth, Huntington, WV
113,900 Graham Baird, York Haven, PA
95,600 Kyle Keller, Overland Park, KS

GALAX ATTAX *(Spectral Associates)*
253,900 ★Shawn McAlpin, Louisville, KY
113,650 Darrin Filand, WA
104,550 Mitch Hayden, Univ. of MN
82,650 Steve Hargis, Tucson, AZ
74,550 John Gosselin, Campbell River, British Columbia

GHOST GOBBLER *(Spectral Associates)*
1,007,430 ★Todd Brannam, Charleston Hts., SC
825,250 Randy Gerber, Wilmette, IL
423,390 Rich McGervey, Morgantown, WV
255,000 John Osborne, Kincardine, Ontario
228,290 Patricia Lau, York, PA

GONE FISHING *(THE RAINBOW)*
8 ★Jeffrey Kocks, Grove City, OH

HEIST *(THE RAINBOW)*
1,300 ★Richard King, Houston, TX

INTERGALACTIC FORCE *(Microdeal)*
254,650 ★Christopher T. Grey, Hollywood, CA
113,600 Alex Taylor, Manchester, England

JUNIOR'S REVENGE *(Computerware)*
3,007,000 ★Tim Brown, Clio, MI
2,154,900 Scott Kubota, Whitby, Ontario
2,099,300 ●Shawn McAlpin, Louisville, KY
1,115,300 Ryan Van Manen, Grand Rapids, MI
1,081,700 Bruce March, Barrie, Ontario

KATERPILLAR ATTACK *(Tom Mix)*
31,672 ★Scott Fairfield, Williamstown, MA
25,949 James A. Lafare, Williamstown, MA
18,949 Vadim Gotovsky, Toronto, Ontario
15,821 Alex Gotovsky, Toronto, Ontario

KEYS OF THE WIZARD *(Spectral Associates)*
662 ★Susan Ballinger, Uxbridge, Ontario
662 ★Pegi Tindle, Soquel, CA

THE KING *(Tom Mix)*
10,000,100 ★Mark Smith, Santa Ana, CA
4,040,300 Andy Truesdale, Ferguson, MO
3,343,000 Corey Friedman, Minnetonka, MN
2,410,200 Candy Harden, Birmingham, AL
2,367,900 Richard Lacharite, Sherbrooke, Quebec
436,200 Paul Rumrill, Gales Ferry, CT
310,700 Javier Cacho, Ft. Knox, KY

KLENDATHU *(Radio Shack)*
1,245,821 ★John Sandberg, Concord, CA
1,182,685 David L. Ferris, Shickshinny, PA

KRON *(Oregon Color Computers)*
224,080 ★Steve & Scott Schneider, OR
73,530 ●Christopher Porter, Naranja Lakes, FL

LADY BUGGY
36,980 ★Tony Cummings, Abington, MA

LANCER *(Spectral Associates)*
2,797,450 ★Randall Edwards, Dunlap, KS
2,354,000 Alex State, Las Vegas, NV
875,150 Larry Capen, Folsom, CA
736,250 Sharon Casten, Folsom, CA
617,500 Donna Willoughby, Brookfield, IL

LASERWORM & FIREFLY *(THE RAINBOW)*
54,672 ★Michael Rosenberg, Prestonsburg, KY

SCOREBOARD

37,250	Rene Belisle, Montreal, Quebec
29,872	Theodore Latham Jr., Rich Square, NC
24,338	Matthew Wilityer, Jackson, NJ
19,402	D. Seibel, Tumbler Ridge, British Columbia
LUNAR ROVER PATROL *(Spectral Associates)*	
162,100	★Sara Aliff, Northeast, MD
154,650	Tom Aliff Jr., Northeast, MD
98,500	Ima Wong, Williamstown, WV
66,900	Wayne Johansen, Rocanville, Saskatchewan
66,850	Randall Edwards, Dunlap, KS
46,400	Joe Sannucci, Elizabeth, NJ
MADNESS & THE MINOTAUR *(Radio Shack)*	
240	★Pegi Tindle, Soquel, CA
MARATHON *(*THE RAINBOW*)*	
101,520	★David Dean, West Mansfield, OH
71,550	Larry Evans, Elk Grove Village, IL
55,110	Michael Rhattigan, Cory, NC
MEGA-BUG *(Radio Shack)*	
60,000	★Robin Worthem, Milwaukee, WI
18,902	John Tiffany, Washington, DC
15,999	Ed Mitchell, Ragged Mountain, CO
14,297	Aleisha Hemphill, Los Angeles, CA
11,894	Paschal Wilson, Kentwood, LA
9,180	Brian Schwartz, Otsego, MI
MEGAPEDE *(Computerware)*	
72,937	★Joe Sannucci, Elizabeth, NJ
METEORS *(Spectral Associates)*	
26,580	★Kevin Endlich, Perry Hall, MD
14,200	●Craig Dutton, Goose Bay, Labrador
MONSTER MAZE *(Radio Shack)*	
650,530	★Bruce March, Barrie, Ontario
533,450	John Hankerd, Gaines, MI
300,000	James Stevenson, Marshall, TX
60,120	Steve Thomas, Ogdensburg, NY
MOON SHUTTLE *(Datasoft)*	
113,642	★Rod Moore, Fork Union, VA
MR. DIG *(Computerware)*	
223,600	★Tommy Wald, Minneapolis, MN
207,800	●Phillip Laurell, Lansing, MI
40,350	Barney A. Sadler, Northwood, ND
MS. GOBBLER *(Spectral Associates)*	
22,680	★Oliver Banta, Lincoln, NE
MUDPIES *(MichTron)*	
156,800	★Glenn Wasson, Castleton, NY
147,400	Chris Hafey, Auburn, CA
18,500	Steve Springer, Louisville, KY
NINJA WARRIOR *(Programmer's Guild)*	
106,300	★Bud Seibel, Tumbler Ridge, British Columbia
102,400	Christopher Gelowitz, Claresholm, Alberta
75,300	Brad Gaucher, Hinton, Alberta
46,400	Daniel Milbrath, Ann Arbor, MI
36,800	Greg Lowry, Davisburg, MI
PAC-ATTACK II *(Computerware)*	
214,210	★Ray Boyko, Whitby, Ontario
189,350	Scott Kubota, Whitby, Ontario
56,014	●Lisa Welte, Baxter, TN
30,150	Jeff Weaver, Gordonville, PA
PAC 'EM *(*THE RAINBOW*)*	
1,934	★Dr. James Peterson, Radcliff, KY
1,870	Steve Olson, Calgary, Alberta
1,572	●Kenneth Bergenham, Lawton, MI
1,556	Rupert Young, Sheffield, MA
371	Victor Prescott, Edinburg, TX
215	Jose Cacho, Ft. Knox, KY
142	Jeffrey Kocks, Grove City, OH
PAC-TAC *(Tom Mix)*	
129,770	★Andrew Lehtola, Mound, MN
100,630	●David Dean, West Mansfield, OH
61,025	John Tyson, Superior, WI
PHANTOM SLAYER *(Med Systems Software)*	
2,668	★Michael Brooks, Glade Spring, VA
2,488	●Troy Messer, Joplin, MO
1,852	Curtis Boyle, Saskatoon, Saskatchewan
1,306	Marc Hassler
PINBALL	
2,800,090	★Glen Ewing, Brooklin, Ontario
PIPELINE *(*THE RAINBOW*)*	
1,110	★Roger Buzard, Lima, OH
1,062	Kent Prehn, Carol Stream, IL
1,030	Anita Howe, Jackson, NJ
838	Johnny Fritsch, Whitehall, PA
793	Bill Fritsch, Whitehall, PA
POLARIS *(Radio Shack)*	
63,053	★Paschal Wilson, Kentwood, LA
POOYAN *(Datasoft)*	
279,450	★Chip Lilley, Finleyville, PA
273,450	Davey Devlin, Clyde, NC
220,950	Daniel Belisle, Montreal, Quebec
181,350	Ronny Ong, Arlington, TX
165,150	Wib Merrithew, Oshawa, Ontario
155,850	Gary Meier, Marshfield, WI
111,300	Nathan Russell, Minco, OK
POPCORN *(Radio Shack)*	
43,970	★Jeff Weaver, Gordonville, PA
39,470	Nicole Freedman, Wellesley, MA
36,210	Brad Gray, Olive Branch, MS
33,910	Wendy Weinschenk, Wickenburg, AZ
32,000	Lisa Welte, Baxter, TN
PROJECT NEBULA *(Radio Shack)*	
1,120	★John Hopkins, Greenville, SC
1,065	William Daley, Biloxi, MS
1,065	Dan Heater, Cortland, OH
995	Dan Bovey, Wheaton, IL
960	Ian Clark, Albion, MI
PYRAMID *(Radio Shack)*	
220/147	★Ssg. Danial Pierce, APO San Francisco, CA
220/224	Tony & Hazel Rye, Ingleside, Ontario
220/289	Douglas G. Oxenreider, Montevideo, MN
220	Steve Olson, Calgary, Alberta
220	Nathan Russell, Minco, OK
200	Jerome Galba, Rochester, MI
Q-NERD *(*THE RAINBOW*)*	
27,800	★Richard King, Houston, TX
3,740	Theodore Latham Jr., Rich Square, NC
RAINBOW ROACH *(*THE RAINBOW*)*	
124,800	★Cheryl Endlich, Perry Hall, MD
113,500	Andrew Smith, Columbia, SC
102,000	●John Statham, Strathroy, Ontario
69,600	Bill Grubbs, Columbus, IN
49,000	Catherine Collingwood, Greenville, SC
REACTOIDS *(Radio Shack)*	
931,395	★Linda Mobbs, Pt. Huron, MI
203,800	Andrew Lehtola, Mound, MN
88,615	●Robbie Anderson, Monrovia, CA
36,320	Roger Rothove, Warrensburg, MO
RETURN OF THE JET-I *(ThunderVision)*	
372,782	★Roger Buzard, Lima, OH
148,112	Matt Griffiths, Stilwell, KS
135,306	Peter Niessen, Carlisle, MA
ROBOTTACK *(Intracolor)*	
2,216,950	★Randy Hankins, Tabor, IA
1,922,200	Erik Merz, Noblesville, IN
1,512,200	Robert Kiser, Monticello, MS
1,424,300	John Osborne, Kincardine, Ontario
1,219,810	Steve Skrzyniarz, Tacoma, WA
565,800	Gary Meier, Marshfield, WI
497,450	Brian Schwartz, Otsego, MI
479,850	Mike Schwartz, Otsego, MI
SANDS OF EGYPT *(Radio Shack)*	
82	★Shawn Hobbs, Hutchinson, KS
82	★John Allocca, Yonkers, NY
87	Kim Van Camp, State Center, IA
106	Sean Haynes, Naples, ME
SCARFMAN *(Cornsoft)*	
253,920	★Scott Boulanger, Columbus, OH
SEA DRAGON *(Adventure International)*	
430,200	★David Lazar, Englishtown, NJ
137,500	●Peter Niessen, Carlisle, MA
75,750	Steve Schweitzer, Sewell, NJ
60,430	Steve Skrzyniarz, Tacoma, WA
56,760	Alan Morris, Chicopee, MA
SEA QUEST *(Mark Data)*	
140	★Shawn Hobbs, Hutchinson, KS
230	Casey Stein, Binghamton, NY
SHARK TREASURE *(Computerware)*	
245,000	★Manon Bertrand, Hauterive, Quebec
175,000	Maurice Boyle, Saskatoon, Saskatchewan
SHOOTING GALLERY *(Radio Shack)*	
120,640	★Robert J. Wallace, Waldorf, MD
59,520	Vernell Peterson, Radcliff, KY
44,870	Mark Nichols, Birsay, Saskatchewan
44,480	R. Duguay, St. Bruno, Quebec
31,340	Martin Peterson, Lynchburg, VA
SKIING *(Radio Shack)*	
12.08	★Kelly Kerr, Wentzville, MO
13.73	Janell Stroshane, Ashland, WI
21.35	Jean-Claude Taliana, Brossard, Canada
29.52	Andrew Truesdale, Ferguson, MO
44.02	Brad Gaucher, Hinton, Alberta
SLAY THE NEREIS *(Radio Shack)*	
328,521	★Edward Meyer, Vancouver, British Columbia
SNAIL'S REVENGE *(*THE RAINBOW*)*	
34,860	★Michael Rosenburg, Prestonsburg, KY
11,380	Varunee Turner, Kamloops, British Columbia
9,230	Jose Cacho, Ft. Knox, KY
6,880	Rupert Young, Sheffield, MA
6,150	Alan Sadler, Northwood, ND
SOLO POKER *(Radio Shack)*	
910	★Carol D. Fitzgerald, Moscow, ID
850	●Granville Bonyata, Tallahasse, FL
740	Allan Mercurio, Portsmouth, RI
SPACE ASSAULT *(Radio Shack)*	
1,632,450	★Walter Brokx, Granisle, British Columbia
537,200	Martin Careau, Quebec City, Quebec
358,660	Mike Snelgrove, Oshawa, Ontario
354,860	Bruce Madariaga, College Park, MD
238,580	John Cole, King City, Ontario
SPACE INVADERS *(Spectral Associates)*	
4,862,040	★F.U. Ingham, Clyde, WI
36,960	Sean Dutton, Goose Bay, Labrador
12,760	John McJilton, Houston, TX
SPACE RACE *(Spectral Associates)*	
60,125	★Mark Nelson, Kent, WA
37,600	Michael Rosenberg, Prestonsburg, KY
SPACE SHUTTLE *(Tom Mix)*	
595	★Steve Schweitzer, Sewell, NJ
585	Kenton Fifield, Fort Francis, Ontario
585	Randall F. Edwards, Dunlap, KS
575	David J. Banks, Greendale, British Columbia
575	Fred Weissman, Brookline, MA
SPACE WAR *(Spectral Associates)*	
400,190	★Mark Felps, Bedford, TX
365,550	Randall Edwards, Dunlap, KS
116,000	Peter Niessen, Carlisle, MA
52,380	Jim Baker, Florissant, MO
15,420	Mark Nelson, Kent, WA
SR-71 *(Tom Mix)*	
4,443	★Jay Johnson, Puyallup, WA
2,570	●Dominique Hall, Williamstown, WV
STARBLAZE *(Radio Shack)*	
10,000	★Dan Burner, Fowler, IL
9,050	●Judith Simon, Warrendale, PA
8,000	Lee Van Dyke, Lansing, MI
7,350	James Hawerbier, Elmhurst, IL
6,850	Jonathan Judge, Oconto, WI
6,250	Mark Welte, Baxter, TN
STAR TREK *(Adventure International)*	
95	★Granville Bonyata, Tallahassee, FL
94	John Brackett, Chicago, IL
STORM ARROWS *(Spectral Associates)*	
168,000	★Steven Ohsie, Deer Park, TX
68,400	Jim Irvine, Sudbury, Ontario
TIME BANDIT *(MichTron)*	
129,240	★Brian Larrson, Fridley, MN
109,170	Mark Wooge, Omaha, NE
106,720	Glen Heidebrecht, Topeka, KS
92,620	Lix Noel Flores, Vallejo, CA
75,640	Sally Naumann, Hailey, ID

MORE... RAINBOW SCOREBOARD

TRAILIN' TAIL *(THE RAINBOW)*

76,275	★Michael Rosenberg, Prestonsburg, KY
33,454	●Kenneth Bergenham, Lawton, MI
24,415	Kentong Fifield, Fort Frances, Ontario

TRAPFALL *(Tom Mix)*

113,408	★Rich Trawick, N. Adams, MI
104,456	Robert Cattral, Ottawa, Ontario
104,424	Brennan Baybeck, Traverse City, MI
104,368	John Osborne, Kincardine, Ontario
98,588	Dan Burch, Louisville, KY

TRIPLE YAHTZEE *(Software Factory)*

2,319	★Betty Gable, Poulsbo, WA

TUBE FRENZY *(Aardvark)*

544,560	★Perry Denton, New Baden, IL
240,060	Randall Edwards, Dunlap, KS
230,000	Ken Felix, Crystal Lake, IL
101,650	Lloyd Albertson, Williams Lake, British Columbia

TUT'S TOMB *(Mark Data)*

158,000	★Chris Russo, Miami, FL
104,360	Gary Marshall, Layton, UT
84,420	Oliver Banta, Lincoln, NE
78,280	Richard Shelton, Bakersfield, CA
71,160	Paul Rumrill, Gales Ferry, CT
62,660	Sander Valyocsik, Yardley, PA
45,900	Joe Sannucci, Elizabeth, NJ
53,520	●Bill Sanders, San Diego, CA

VENTURER *(Aardvark)*

6,718,200	★Kyle Keller, Overland Park, KS
4,126,200	Greg Scott, Orlando, FL
2,291,100	Mike Sitzer, Roslyn, NY
2,657,350	Brian Panepinto, Spencerport, NY
1,769,400	Todd Hauschildt, Red Wing, MN

WACKY FOOD *(Arcade Animation)*

105,100	★Stephane Asselin, Hauterive, Quebec

WHIRLYBIRD RUN *(Spectral Associates)*

516,450	★Dan Shargel, Arroyo Grande, CA
283,100	Nathan Russell, Minco, OK
157,000	Hughens Bien-Aime, Montreal, Quebec
103,900	Dann Fabian, Crestview, FL
98,400	Dave Lubnow, Sussex, NJ

WILDCATTING *(Radio Shack)*

110,579	★Nicholas Siclari, Staten Island, NY
63,723	●Michael Rosenberg, Prestonsburg, KY
48,682	David Rodgers, Carbondale, IL
38,318	Ellen Ballinger, Uxbridge, Ontario
34,828	Kerri Dutton, Goose Bay, Labrador

ZAKSUND *(Elite Software)*

1,256,000	★Robert Conyer, Willingboro, NJ
1,128,050	Richard Minton, West Frankfort, IL
1,008,100	Andy Mickelson, Granville, OH
950,500	Michael Rothman, Solon, OH
910,000	Steve Schweitzer, Sewell, NJ

ZAXXON *(Datasoft)*

1,510,000	★James Quadrella, Brooklyn, NY
401,900	Mike Hughey, King George, VA
370,400	Chris Coyle, Selden, NY
260,600	Roger Buzard, Lima, OH
235,200	Rich McGervey, Morgantown, WV
125,600	Steve Manderschied, Cincinnati, OH
111,100	Gary Meier, Marshfield, WI
98,100	Richie Peters, Ringgold, GA
89,900	Craig Hess, Topeka, KS
89,500	Brian Manderschied, Cincinnati, OH
82,900	Jeremy Saks, Ridgefield, CT
67,900	Theodore Latham Jr., Rich Square, NC

ZEUS *(Aardvark)*

89,100	★Mike Schwartz, Otsego, MI
69,900	Kevin Schwartz, Otsego, MI
62,800	Brian Schwartz, Otsego, MI

— Kevin Nickols

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints and tips, we encourage you to share them by sending them to the Scoreboard, c/o THE RAINBOW.

TAMING CANYON CLIMBER

Scoreboard:

My most frequently used and favorite cartridge is *Canyon Climber*. I taped over the number 8 pin with clear adhesive tape so that I can program with the cartridge in the computer. When I want to play a few games, I simply type *EXEC 49152*.

For those of you that have this game and aren't too successful at it, I have a hint. Personally, I think five lives aren't enough when you reach the more difficult levels, so simply type *EXEC 49222*. The score at the bottom will display 800,600. If the screen is blurred, hit the Reset button. Now you have an almost unlimited amount of lives. Also, for an unusual sight, type *EXEC 49232* to set the cartridge in *PMODE 1*.

D. Craig McCormick
Vienna, VA

Scoreboard:

I am looking for some help with the *Chromasette* program *Williamsburg Adventure*. I can't get out of the tavern after paying for the meal. After I am served my meal, there isn't anywhere that I can go. Write to me at R.R. 1, Box T-7, 56383.

Here's a hint for those of you who are trying to write scrolling games in BASIC. Use Lo-Res graphics and *PRINT@ 511,"";* to scroll the screen up one line.

Rogers George IV
Terrace, MN

LIFE EVERLASTING

Scoreboard:

To all those game addicts out there who are having difficulty getting past a certain point in an arcade-type game, don't despair! The following is a list of pokes to aid you by increasing the number of allotted players.

In the list, x is any number between 1 and &HFF (255), numbers in the parentheses are decimal values, and numbers between the asterisks are the beginning addresses of the programs.

Astro Blast	&H190F, x(6415) * &H1648(5704) *
Berserk (Haywire)	&H16F0, x(5872) * &H1648(5704) *
Colorpede	Speed up 7690,88 Slow down 7689,0 * &H1648(5704) *
Dunkey Munkey	&H3B11, x(15121) * &H3A00(14848) *
Doubleback	&H10E9, x(4329) * &H1000(4096) *
Fury	&H367F, x(13951) * &H3300(13056) *
Ghost Gobbler	&H2373, x(9075) SHIFT @, when prompted at "name?" gives high speed * &H2222(8738) *
Space Invaders	&H1DFA, x(7674)
fewer bombs	&H1DD7,255 * &H1C00(7168) *
Katerpillar	&H29F3, x(10739) * &H2900(10496) *
The King	&H3272, x(12914)
non-practice mode	&H3259, # (12889)
Level #=	2 for elevators 10 for rivits 18 for conveyor belts * &H3203(12803) *
Ms. Ghost	&H52A3, x(21115) * &H5151(20817) *
Meteors	Push X for 1 joystick
shield	&H1EF4,100 * &H1C1C(7196) *
PacTac	&H2331, x(9009) * &H2000(8192) *
PacTac 2	&H28F9, x(10489)
Protectors	13579,90 (1 joystick) * &H2200(8704) *

Space Race	&H298E, x(10638) * &H2800(10240) *
The Frog	&H2EE2, x(12002) * &H2C00(11264) *
Trapfall	&H2CBC, x(11452) * &H1E00(7680) *
Electron	&H36C3, x(14019) * &H1600(5632) *
Whirlybird	&H2078, x(8312) * &H1E00(7680) *
Zaxxon	&H6418, x(25624) * &H3C90(15504) *

Tom Fagan
Tucson, AZ

Editor's Note: We thank Tom for such a comprehensive list of game pokes and we decided to pass them on to the readers, but *please* resist using such tips as these when submitting entries to the *Scoreboard*.

COPTER CONTROL

Scoreboard:

Jason Nannen's *Cavern Copter* (Feb. '84 RAINBOW) is a good game and the following addition and change makes it dramatically better. These lines give you full control — up, down, forward, reverse and hover — of the 'copter. Such maneuvering gives time for more creatures to appear also.

```
660 J=JOYSTK(0)-31
665 X=X+J:IFX<0THENX=0ELSEIF
X>236THEN400
```

Jim La Lone
Ooltewah, TN

DOWN AND OUT IN FORSAKEN GULCH

Scoreboard:

I bought *Adventure Trilogy* back in March, 1983, and I've been working on it ever since. I've gone all the way down to the Forsaken Gulch and been stuck there, baffled. If anyone comes up with an answer, would you please send it to me at 350 Union St., 92024. I'm willing to converse with anyone who takes an interest in the Color Computer and look forward to a response.

Richard Coleman
Leucadia, CA

Scoreboard:

I love Adventures and I loved your tutorial on making Adventures in BASIC (Feb. '84 RAINBOW). My main problem now is trying to think up "logic traps" like the serpent in *Pyramid* or the rug in *Raaka-Tu* (which I still haven't figured out). Also, I have been attempting to make an Adventure in assembly language. I tried disassembling *Pyramid* and managed to find the memory locations of the commands and objects, but I can't find where the room descriptions are located.

If anyone would like to give me a few hints on logic traps or programming Adventures in assembly language, write to me at 1450 Picadilly St., 23513.

Harry Perkins III
Norfolk, VA

ROLL ME OVER IN THE CLOVER

Scoreboard:

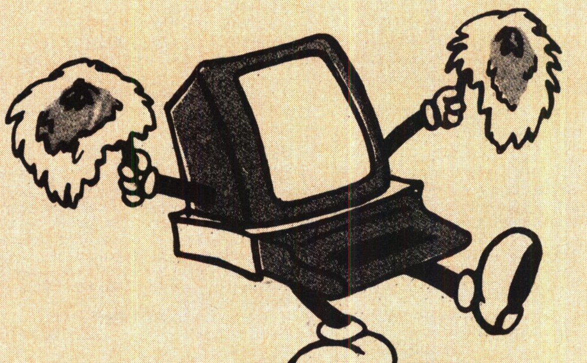
I have had *Shenanigans* for about two months and I can't get by the lady in the clover patch or past the snake. If anybody could give me some help, please send it to 4345 Still Meadow Lane, 48033. Also, I would like a list of good 32K graphics Adventures.

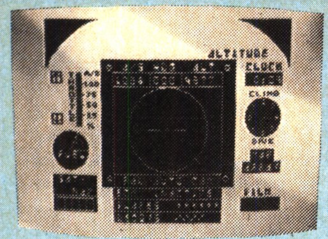
George Mueller
West Bloomfield, MI

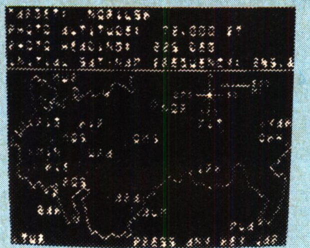
Scoreboard:

Help! I've been playing *The Amazing Adventures of Karrak* (Feb. '84 RAINBOW) ever since February and I'm stuck on the beginning of the fourth game. I can't get out of the cell. If anyone can tell me what to do, please write to me at 216 Cardinal Ct., 55318.

Tina Hermanek
Chaska, MN



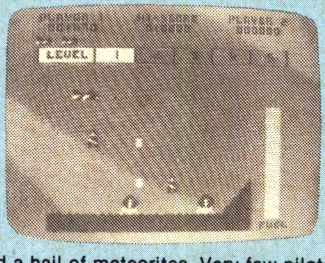




SR-71

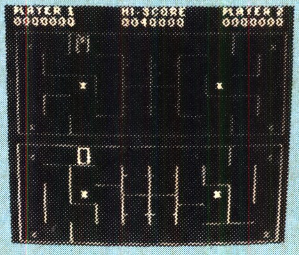
SR-71 is a fast action game in which you are the pilot on a mission to take photographs of missile sites in Russia and deliver them to our processing laboratory in Japan. So real you will feel as if you are in the cockpit on a real spy mission. Elude Russian missiles as well as their detection devices. Another Tom Mix exclusive. A must for the adventurous. Fantastic graphics, color and sound. **32K Ext. Basic** **TAPE $28.95** **DISK $31.95**

SKRAMBLE



Your mission is to penetrate the enemy skramble system and destroy their headquarters. You will start with three of our latest spacefighters equipped with repeating cannon and twin bomb launcher. If you succeed in evading the elaborate ground defenses, you will arrive at the Cave where flying becomes more difficult. In the cave are UFOs, after which you must avoid a hail of meteorites. Very few pilots succeed this far, but if you do, then you must enter the Fortress, followed by the Maze. One or two player game. Machine Language, high speed, Arcade action. Full color graphics with sound. Keyboard or joystick control.

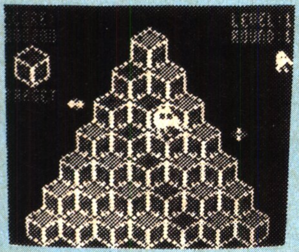
16K MACHINE LANGUAGE **TAPE $24.95** **DISK $27.95**



GRABBER

A pac type game. Two complete mazes jump from one to the other. Probably the most outstanding sound you have ever heard. Arcade Action. Method of play, you are the Grabber. The object is to grab the 8 treasures and store them in the center boxes. You start with 3 Grabbers and get extra ones at 20,000 points. Watch out for the googlies! Super high resolution graphics.

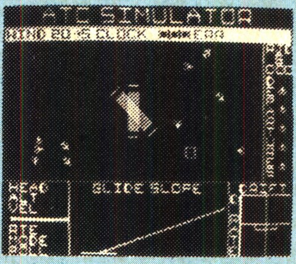
32K MACHINE LANGUAGE
TAPE $27.95 **DISK $30.95**



CU✱BER

Approaches the excitement and challenges of any Video Arcade. The hazards of CU✱BER are many. Help CU✱BER change the colors on the pyramid while avoiding many of the dangers always present. Vipers, the Nurd, the Dork, bonus points all add up to another exciting release from Tom Mix Software.

32K MACHINE LANGUAGE
TAPE $27.95 **DISK $30.95**



AIR TRAFFIC CONTROLLER

Air Traffic Controller is a computer model of an air traffic control situation for the TRS-80 Color Computer. Remotely Piloted Vehicles (RPV's) are operated by the controller in a situation similar to that of a commercial airline in that you must regulate landings and takeoffs of the vehicles.

32K EXT. BASIC
TAPE $28.95 **DISK $31.95**

KATERPILLAR II

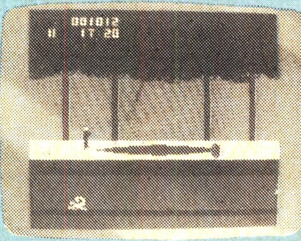
The color computer has needed a perfect centipede type game since day one. You will throw all imitations aside when you see this. So close to the arcade you will start digging for quarters. Grapic to equal "The King" and "Buzzard Bait." Joysticks required.

16K MACHINE LANGUAGE
TAPE $24.95 **DISK $27.95**

TRAPFALL

The "Pitfalls" in this game are many. Hidden treasures, jump over the pits, swing on the vine, watch out for alligators, beware of the scorpion. Another game for the Color Computer with the same high resolution graphics as "The King."

16K MACHINE LANGUAGE
TAPE $27.95 **DISK $30.95**



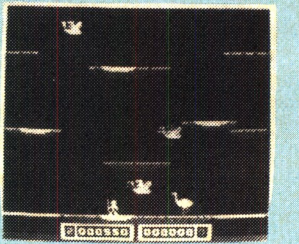
FANGMAN

Fangman is a high-resolution graphics arcade-type game based on the Dracula legend. Plot of Game: You're Dracula in your castle, stalking through a labrynth of passages in search of invading villagers seeking to destroy you by blocking your every path with deadly crosses. Their ally the Sun also wanders your halls, trying to touch you and turn you to bones and dust. Fortunately, you have allies of your own, the vampire bats who cahse down the villagers, holding them till you arive. Joysticks required. **16K MACHINE LANGUAGE**
TAPE $24.95 **DISK $27.95**

BUZZARD BAIT

We've done it again. You thought The King was great? Wait til you see this!! Outstanding high resolution graphics, tremendous sound make this "joust" type game a must for your software collection. As you fly from cloud to cloud you will enjoy sky high excitement dealing with the challenges presented to you by this newest release by Tom Mix Software. Joysticks required.

32K MACHINE LANGUAGE
TAPE $27.95 **DISK $30.95**



UTILITIES

SCREEN PRINT ROUTINE Prints contents of your graphic screen to an Epson, Microline or Radio Shack DMP Printers. Prints positive or reverse format. Horizontal or vertical, small and large printout. Print left, right or center of page. Specify printer when ordering. **TAPE $19.95** **DISK $21.95**

TAPE TO DISK New version works on both 1.0 and 1.1 DOS. Load the contents of most tape to disk automatically. **Machine Language**
TAPE $17.95 **DISK $21.95**

COLOR MONITOR Written in position independent code. (May be located in any free memory). Very compact. Only occupies 1174 bytes of memory. Full featured, includes Break-Pointing of machine language programs, register display and modify, memory display and modify, and block memory move commands. Displays memory in hex and ascii format on one line 8 bytes long. **Machine Language**
TAPE $24.95 **DISK $27.95**

TOM MIX SOFTWARE
4285 BRADFORD N.E.
GRAND RAPIDS, MI 49506

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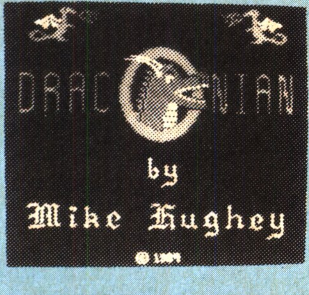
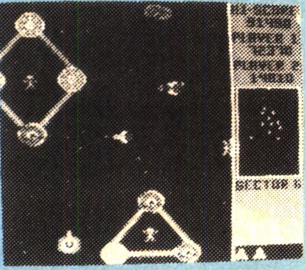




DRACONIAN

You brace yourself as your ship materializes in the enemy sector. Your engine roars to life, and you consult the long-range scanner for the position of the nearest enemy base. As you head for the base, blasting asteroids and space-mines in your path, you suddenly notice a monstrous space-dragon looming before you. Reacting quickly, you dodge his deadly fire-breath and blast him out of existence.

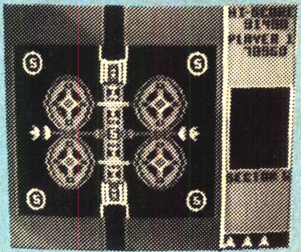
Finally, the enemy base comes into view. Avoiding the enemy fire, you destroy the gun turrets one by one with your rapid-fire torpedoes. Then, with the explosions still echoing around you, you rescue the astronaut who was being held prisoner by the enemy. Your mission is far from over, however, as there are more bases to destroy and more astronauts to rescue before the sector will be secured. And all must be done quickly; if you are too slow, the invincible DRACONIAN will surely seek you out as its next victim.

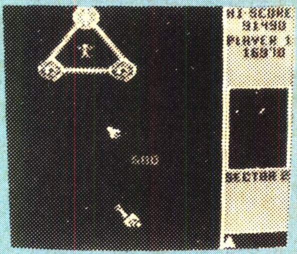
This is it — the single most impressive, awe-inspiring arcade game you can buy for your Color Computer. High-resolution graphics, awesome sound effects, four-voice music, and quality you have to see to believe! Experience the realism of DRACONIAN today!

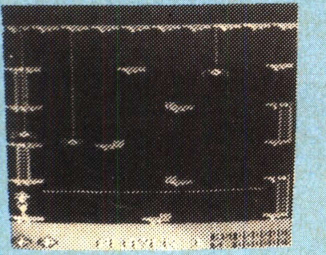
JOYSTICKS REQUIRED

32K MACHINE LANGUAGE

TAPE $27.95 **DISK $30.95**







CRASH

This game is a high resolution Machine Language program with outstanding Arcade type graphics. The game consists of 4 screens. Fly the airplane over and through obstacles. Piloted by "Mario" who also appeard in "The King". The object is to conquer one screen after another but don't "Crash". Great fun for the whole family. For 1 or 2 players. Uses joysticks.

32K MACHINE LANGUAGE

TAPE $24.95 **DISK $27.95**

CHAMBERS

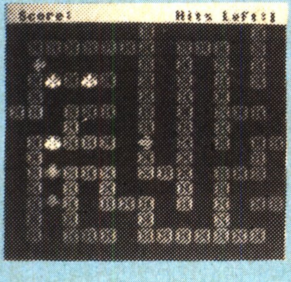
Exciting high resolution graphics game. Multiple screens. Outstanding sound, Chambers is loosely based on Cosmic Chasm. The object in each level is to destroy all of the evil creatures in each room and then go into the main reactor room and blow up the base.

JOYSTICKS REQUIRED

32K MACHINE LANGUAGE

TAPE $24.95 **DISK $27.95**

CHAMBERS
TOM MIX



WAREHOUSE MUTANTS

Journey through the warehouse seeking out the Mutants who are out to destroy you. WATCH OUT! They will push crates trying to crush you! Outstanding realism—high resolution graphics—multiple screens.

JOYSTICKS REQUIRED

16K MACH. LANGUAGE

TAPE $24.95

DISK $27.95

QUIX

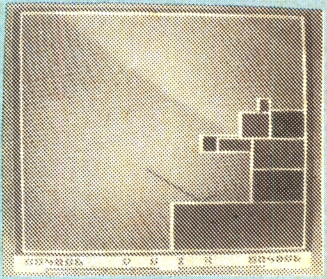
This one is after a popular arcade game with a similar name. Simply frustrating—you'll love it. Done in high resolution graphics with Super Sound.

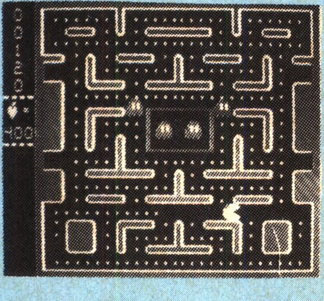
JOYSTICKS REQUIRED

32K MACH. LANGUAGE

TAPE $24.95

DISK $27.95





MS. MAZE

MS. MAZE is remarkable in that it combines brilliant color, high resolution, detailed graphics, and music with a very playable game. Anything that could be done to make the Color Computer look and play like the arcade version has been done. MS. MAZE is without question the closest thing to the arcade Pac games that I have seen for the Coco.

JOYSTICKS REQUIRED

32K MACHINE LANGUAGE

TAPE $24.95 **DISK $27.95**

PAK-PANIC

Pakman is steered thru a maze eating dots and powerpills. Pakman is pursued by four monsters who try to catch and kill him. If Pakman eats a powerpill he becomes powerful and can eat monsters. Monsters try to avoid a powerful Pakman. As monsters are eaten their ghosts appear on the top of the screen. When seven ghosts have appeared one will fly across the screen or they will link together forming a centipede that will travel thru the maze. Pakman has no power against ghosts and centipedes and must avoid them or be killed. **JOYSTICKS REQUIRED**

32K MACHINE LANGUAGE

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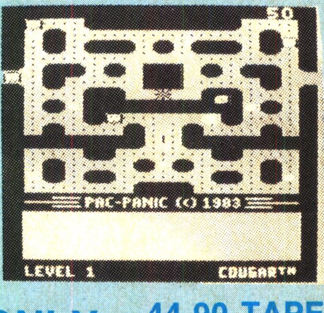

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VIP Terminal™
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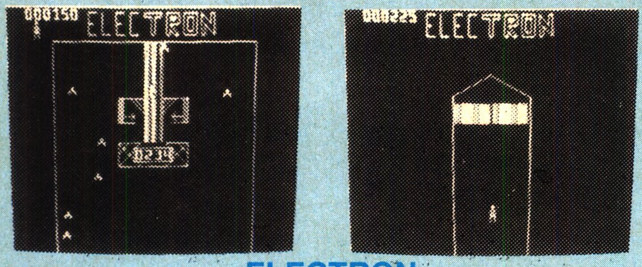
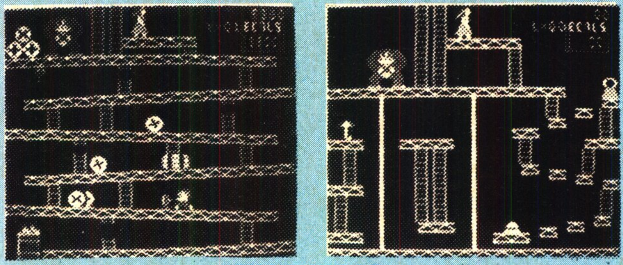
VIP Database™
INCLUDES MAIL MERGE CAPABILITIES TOO! 32K DISK $59.95 64K Required for math package & mail merge.

VIP Disk-ZAP™
Repairs crashed disks.
16K DISK $49.95 Lowercase displays not available with this program.



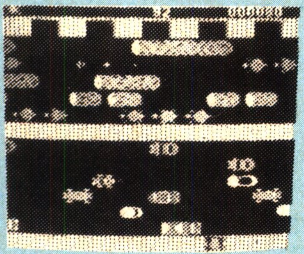
ELECTRON

Electron is composed of four subgames. You must complete one level in order to advance to the next. Supplied with four men, you are subjected to more difficult games as you move ahead. Beam Buggy, Prachnids, Force Fields and a Maze!
JOYSTICKS REQUIRED, 16K MACHINE LANGUAGE
TAPE $24.95 DISK $27.95



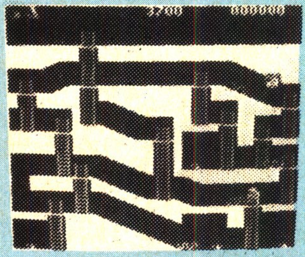
THE KING

This game contains all 4 full graphic screens like the popular arcade game. Exciting sound and realistic graphics. Never before has the color computer seen a game like this. Early reviews say simply outstanding. **JOYSTICKS REQUIRED**
32K MACHINE LANGUAGE
TAPE $26.95 DISK $29.95



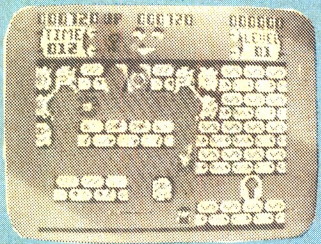
THE FROG

This one will give you hours of exciting play. Cross the busy highway to the safety of the median and rest awhile before you set out across the swollen river teaming with hidden hazards. Outstanding sound and graphics. Play from keyboard or joysticks.
16K MACHINE LANGUAGE
TAPE $27.95 DISK $30.95



KING TUT

Journey through the caverns of King Tut's tomb. You are on a quest to find treasures hidden in the cavrns below. You light your way with only a small candle that grows dimmer as time passes. Watch out for the snakes and the ghost of King Tut himself. **Five** screens challenge your abilities every step of the way. Joysticks required.
16K MACHINE LANGUAGE
TAPE $27.95 DISK $30.95



THE TOUCHSTONE

You are one of many priests of Ra who has accepted the challenge of the touchstone. The challenge is a way for any of Ra's followers to become a favored high priest. Given limited use of Ra's powers, you will battle hidden dangers. Entering the mazes, you must be ready for anything.
32K MACHINE LANGUAGE
TAPE $27.95 DISK $30.95

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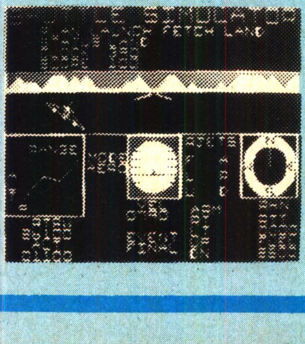

SPACE SHUTTLE

This program gives you the real feeling of flight. Full instrumentation complete to the max. Radar, altimeter, air speed, artificial horizon, fuel gauge, a mission status panel and much more. Actual simulation of space flight, weather conditions must be considered.
JOYSTICKS REQUIRED
32K EXTENDED BASIC
TAPE $28.95 DISK $31.95

EDUCATIONAL

VOCABULARY MANAGEMENT SYSTEM

16K Extended basic/32K for printer output TAPE $39.95 DISK $42.95

The Vocabulary Management System (VMS) is a series of programs designed to aid a parent or teacher in helping children to learn and practice using vocabulary and spelling words. The 9 programs that comprise the VMS include a full feature data entry/edit program, three printer output programs and 5 vocabulary/spelling game programs. The system's many outstanding features include:

—As many as 300 vocabulary words and definitions may be in the computer's memory at one time.
—Words and definitions may be saved on disk or tape.
—Remarks and/or comments can be saved with word files.
—A disk loading menu allows students to load disk files without typing file names.
—Word lists may be quickly alphabetized
—The three printer segments allow you to create and print individualized tests, puzzles, word-searches and worksheets.
—Answer keys may be printed for all worksheets and puzzles.
—The printer segments allow full use of your printer's special features.
—The 5 game programs are based on sound educational principles and provide practice in identifying words and matching them with their definitions in a fast-paced set of activities.

STORY PROBLEMS

STORY PROBLEMS is a program that is designed to give practice in solving story problems (sometimes called statement thought or word problems) on the Color Computer. It is suitable for use in either a home or school environment. It is also a tool that will allow you to create new story problems to suit your children's needs and ability levels. It has many features that make it particularly attractive:

- Story problems involving addition, subtraction, multiplication, division or a combination of the four are presented to the student by slowly scrolling each letter of each problem onto the screen.
- Up to 5 students may use the program at the same time.
- There are 4, user modifiable, skill levels.

16K EXT. BASIC TAPE $19.95 DISK $22.95

MATH DRILL

MATH DRILL is a program designed to help children to practice addition, subtraction, multiplication and division skills on the Color Computer. It has several features that make its use particularly attractive:

- Up to 6 students may use the program at the same time.
- Answers for addition, subtraction and multiplication are entered from right to left, just as they are written on paper.
- Commas may be included in the answers.
- Partial products for the multiplication problems may be computed on the screen.
- Division answers that have a remainder are entered as a whole number followed by the letter "R" and the remainder.
- The are ten, user modifiable, skill levels.
- A "SMILEY FACE" is used for motivation and reward. Its size increases relative to the skill level.
- Skill levels automatically adjust to the student's ability.
- A timer measures the time used to answer each problem and the total time used for a series of problems.
- After a problem has been answered incorrectly the correct answer appears under (above in division) the incorrect answer.

REQUIRES 16K EXT. BASIC
TAPE $19.95 DISK $22.95

ESTIMATE

ESTIMATE is a program designed to help children to practice estimating the answers to addition, subtraction, multiplication and division problems on the Color Computer. It has many features that make its use particularly attractive:

- Up to 5 students may use the program at the same time.
- There are 5, user modifiable, skill levels.
- The acceptable percent error may be changed as a student's skill improves.
- A timer measures the number of seconds used to answer each problem and the total time used for a series of problems.
- If a problem has been answered incorrectly, the student is told the percent error and asked to try again.
- If a problem is answered incorrectly a second time, the student is told the correct answer and the range of acceptable answers is displayed.
- A report is given at the end of each set of problems that includes the number of problems done, the number of problems answered correctly on the first try and the average percent error.
- The (BREAK) key has been disabled so that a child will not inadvertently stop the program from running.

REQURIES 16K EXT. BASIC
TAPE $19.95 DISK $22.95

TEACHER'S DATABASE

TEACHER'S DATABASE is a program designed to allow a teacher to keep a computerized file of information about his/her students. There are many features that make this program particularly attractive:

- Information on as many as 100 students (or more) may be in the computer at one time.
- Each student may have as many as 20 (or more) individual items of data in his/her record.
- The program will run from cassette or disk.
- Cassette and disk files are completely compatible.
- The program is menu driven.
- Records may be easily changed, deleted, combined or added.
- Information about students may be numerical or text.
- Records may be quickly alphabetized.
- Records may be sorted by various criteria.
- Records may be reordered (ranked) based on test scores or other data.
- Data displayed during a sort may be printed on a printer or saved on disk or cassette as a new file.
- A full statistical analysis of data may be done and sent to the printer.
- Student test scores may be weighted.

REQURES 32K EXT. BASIC
TAPE $39.95 DISK $42.95

PRE-ALGEBRA I INTEGERS

INTEGERS is a series of four programs designed to give students practice in working with addition, subtraction, multiplication, division and the comparison of integers. It has many features that make a very valuable tool for introducing and/or maintaining skills:

- Up to 4 students may use the program at the same time.
- There are 9, user modifiable, skill levels.
- Students are given two opportunities to answer a problem.
- A detailed report of student performance, including number correct on first try, number wrong, total time used and percentage score, is presented at the end of a series of problems.
- The programs will run on a 16K TRS-80 Color Computer with or without disk drive.

Four distinct problem formats are presented. The first presents problems in this format: – 12 + – 9 = ?. The second program presents a problem with missing numerals in this format: – 7 – ? = 18. The third program presents a problem with a missing sign: 8 – ?6 = 14. The last program asks the student to determine the relationship (=, or) between two statments 3 – 9 (??) – 4 – 5.

TAPE $29.95 DISK $32.95

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SIMULATION TUTORIAL

16K
ECB

This is the first installment of a series on creating Simulations for the Color Computer.

Computer Simulations For Fun And Profit

By Robert K. Tyson, Ph.D.

Prophecy by computer is an art form and it is a science. Computer Simulations are used for examining events which can or will be duplicated in the real world. So far, computers have been used to simulate traffic patterns, human population changes, molecular chemistry, the weather, and countless other things. Computers have even been used to simulate other computers to determine data rates, I/O throughput, computational speed, and debugging techniques. Since many phenomena that we can observe are governed by a mathematical formula, a computer Simulation can be used to expand our window into the world. When random occurrences determine the outcome of a series of events, a computer Simulation is particularly useful since it can simulate literally thousands or millions of events. An investigator can then determine probable outcomes.

Of course, many situations that we wish to simulate are not determined by formulae or probability but are controlled by a logical human thought process. These "heuristic" Simulations are often the most useful and the most fun. For instance *Strategy Football* (THE RAINBOW, August 1983) is a heuristic Simulation with formulae and random occurrences taking a back seat. The NASA computer Simulations which determine the best time to launch, to fire boosters, etc. are almost entirely formula driven with little or no human tampering. A Simulation of roulette (Gerry Schechter, THE RAINBOW, April 1984) is based on random motions of the ball and wheel while the betting payoffs are strictly formula derived. The human interaction is used only for changing the initial conditions. These three methods of prophesy; formulae, random (probability), and human, all coupled through logic, form the basis for all computer Simulations.

What is the difference between a computer Simulation and a computer Model? Actually, very little. The difference is about the same as the difference between human anatomy and human physiology. One is the structure of the object while the other is the function of it. A Model is nothing more than a scaled-down replica of an object so it can be studied more easily, cheaply, or safely than studying the real object. A computer Model is a computer-scale replica of an object or a process. A computer Simulation is the function of the computer Model. The Model is the "program;" the Simulation is "running the program." To have a successful Simulation one must begin by building a reasonable Model of it. You must determine what you want it to do, then, limited by your resources, you write a program to do it.

This article is the first of a series discussing the makeup of a computer Simulation, how to implement the idea into a usable computer program, and how to use its results. I will discuss the fundamentals showing you how they can be used in a scientific Simulation of orbital motion. The next article in the series will emphasize human thought by the "investor" in a realistic simulation of the stock market. I will also discuss some special hints for simulating war (strategic conflict and tactical conflict), simulating sports events and, a brief word about human thought Simulations (artificial intelligence).

Once the idea or problem is formulated (in this case, orbital motion) I must define a "universe." This term sounds more alarming than it really is. The universe simply provides me with the boundaries in which to work. For instance, shall I simulate the entire solor system (a problem with 10 or more independent objects), or the entire Milky Way galaxy (billions of variables)? No, for purposes of illustration, I will choose a simple planet/satellite system and allow myself to vary the laws which govern the force between the two bodies. For fun, I want to be able to alter the motion of the satellite during the course of the Simulation. I will also add some random processes later to simulate "random" meteorites, etc.

Defining the universe is just the first step of placing constraints on the Simulation. Thorough knowledge of your computer is required to really form the basis for the Simulation. Remember, the CoCo uses five bytes for each variable

---

(Dr. Bob Tyson is a senior systems engineer at United Technologies Research Center, where he designs and analyzes high energy laser systems using computer simulations. His CoCo Simulations include Strategy Football *[August 1983 issue] and* Election '84 *[November 1983 issue].)*

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so storing the position, the velocity, and the acceleration (all in three dimensions), requires 45 bytes for *each* body in motion. This may not be a problem for a simple solar system Simulation where we only worry about the major planets and their motion, but it becomes formidable when we start to include the dozens of moons and hundreds of asteroids, not to mention keeping track of the rotations, magnetic fields, etc., of each. Pretty soon the biggest constraint to the Simulation universe becomes the computer itself.

For sake of simplicity and illustration my universe contains one planet, with a mass much larger than the satellite (so it doesn't move), and I will restrict motion to two dimensions rather than three. This is actually pretty reasonable since two bodies in space will only move in a two-dimensional plane anyway. This also allows me to watch the motion in graphics form rather than just stare at a stream of numbers.

Now that I know my universe, I must give it a start. I must define my "initial boundary conditions." The "final conditions" are not defined for this Simulation, but in many cases we may want to know them, e.g. the state of the satellite after two hours. In that case the Simulation will halt after the final conditions are met. Computer Simulations are equally useful and valid in either case. A spreadsheet calculation from *Elite*Calc* is nothing more than a Simulation with open final boundary conditions.

The set-up clearly defines the universe while the number entry inputs the initial boundary conditions. For my Simulation, I will put the planet in the center of the solar system (on the graphics screen) and place the satellite close to it. The computer can then prompt me for an initial velocity and direction of the satellite. I will then be able to observe its trajectory (orbit). I may want to see what a satellite with random initial direction will do. The Simulation will let me select random initial conditions. I also want to be able to alter the velocity of the satellite by "human interaction." That is accomplished by scanning the keyboard during the course of the Simulation to search for an arrow-key press. The right arrow speeds up the satellite while the left-arrow slows it down. This could be used to simulate an OMS (orbital maneuvering system) burn of the space shuttle. With this set of conditions and a universe you're ready to key in the program listed and begin the Simulation.

Begin by choosing "deterministic" starting conditions. When the Simulation asks for a velocity, enter '1'. (Don't type the quotes). For the angle, try '90'. The orbit should be a nice ellipse, just like Kepler predicted. Hit BREAK and restart. Try velocity=2, angle=90. To get a circular orbit, try velocity=1.3, angle=90. Now go ahead and play with it. You will see all three of Kepler's laws demonstrated. Some of the orbits will not be closed, that is the satellite will go screaming off the screen. These are parabolas and hyperbolas. If your satellite goes near the planet, you will see the famous "slingshot" effect. The dots plotted are equal timesteps so notice how the satellite speeds up near the planet. This acceleration has been used successfully to send probes to the outer planets as well as men to the moon. If you measure the area of the triangle formed by any other two adjacent dots and the planet, it will be the same area as the triangle formed by any other two adjacent dots and the planet. Kepler thought of this one, too. (Note to science students: Don't be too picky; I know that the equal area law is not made up of triangles, but it uses areas of sectors of the ellipses. If you can figure an easy way to measure the areas on the non-square video display, you'll be accurate enough.)

While you're at it, try "driving" the satellite around using the left- and right-arrow keys. It's an art to get used to exploiting the laws of orbital mechanics, but it's like riding a bike; once you have it, you have it forever. If you don't want to plot the entire trajectory but just want to see the satellite and the planet, change the MODE in Line 10 to MODE=0.

There is one other neat change you can make. Remember, I said that I wanted to be able to vary the force between the two bodies? Well, now's your chance to be Isaac Newton. The law of universal gravitation states that the force between two bodies is proportional to the *square* of the inverse of the distance between them. If that got by you, don't worry. It just means that the exponent in the denominator of the equation that calculates the force is 2. If the exponent is bigger the force would be less; if smaller than 2, the force would be greater. Kepler (him again) showed that only the exponent 2 would give you closed orbits — ones that come back to where they started and repeat. I wanted to see if he was right.

To change the exponent, just retype Line 20 with N equal to anything you like. Try 20 N=1.5. Now *RUN* the Simulation and enter the initial conditions that gave you an ellipse, velocity=1, angle=90. Let it go. Watch the orbit of the satellite now that the force law is changed. Boy, am I glad we don't live in a universe like that; the moon would be full for a few days, then it would come ripping by, creating tides you wouldn't believe. Then it would go away and take longer to come back. Every month would be longer until the moon just went away.

This simple, short, but powerful computer Simulation allowed us to prophesy the end of the world as we know it just by altering the laws of motion (no simple task). Computer Simulations don't have to be long, complicated, number-crunching beasts. Just create your universe and give it a push.

80 48
END 103

The listing:

```
5 'SIMULATION OF ORBITAL MOTION
 BY DR. BOB TYSON - 1984
10 PCLEAR 4:ZX=128:ZY=96:PX=128:
PY=32:MODE=1:CLS
20 N=2.0 'N=EXPONENT OF THE FORC
E LAW
30 V=RND(TIMER)
40 CLS:PRINT"ORBIT INVESTIGATION
S":PRINT:PRINT"SELECT STARTING C
ONDITIONS:       R=RANDOM
                 D=DETERMINISTIC"
50 K$=INKEY$:IF K$=""THEN 50 ELS
E IF K$="R" THEN 60 ELSE IF K$="
D" THEN 70 ELSE 50
60 V=RND(5):A=RND(360):CLS:PRINT
 "VELOCITY=";V:PRINT"ANGLE OF EN
TRY=";A;" DEG.":FOR I=1 TO 1500:
NEXT:GOTO 90
70 PRINT:INPUT"SATELLITE VELOCIT
```

```
Y 0-8";V:IF V<0 OR V>8 THEN 70
80 PRINT:INPUT"ANGLE OF VELOCITY
 0-360          CLOCKWISE FROM 12
 O'CLOCK POSIT.";A
90 VX=V*SIN(A*.0174532):VY=-V*CO
S(A*.0174532)   'VELOCITY COMPONE
NTS
100 M=100:PMODE 4,1:SCREEN 1,0:P
CLS
110 GOSUB 160
120 R=SQR((PX-ZX)^2+(PY-ZY)^2):A
X=(M/R^N)*(ZX-PX)/R:AY=(M/R^N)*(
ZY-PY)/R:VX=AX+VX:VY=AY+VY:PX=PX
+VX:PY=PY+VY   'VELOCITY AND POSI
TION CALCULATIONS
130 K$=INKEY$:IF K$="" THEN 110
ELSE IF K$=CHR$(9) THEN U=1 ELSE
 IF K$=CHR$(8) THEN U=-1 ELSE EN
D
140 V=SQR(VX*VX+VY*VY):VX=VX+U*V
X/V:VY=VY+U*VY/V
150 GOTO 110
160 IF MODE<>1 THEN PRESET(QX,QY
)
170 CIRCLE(ZX,ZY),2:IF PX<0 OR P
X>255 OR PY<0 OR PY>191 THEN 190
180 PSET(PX,PY,1):QX=PX:QY=PY
190 RETURN
```

Adventure Contest Update

In case some of you chronic procrastinators and hunt-and-peck programmers haven't noticed yet, the deadline for the Second Annual RAINBOW Adventure Contest has long since passed and the judging is under way. Entries have poured into THE RAINBOW's offices from nearly every corner of the Earth. From the Australian Outback to the Soviet-patrolled shores of Finland. From the tropical climes of Mexico to the frozen tundra of Canada. And from nearly every state in the Union. One thing is certain: Adventure and the CoCo are international pursuits.

Without exception, the entries in this year's contest are more sophisticated and more mind-boggling than those in the last. Already, some of the judges are showing signs of wear-and-tear from so many encounters with death. Last year we were lucky — this year, some may not survive.

But seriously, the competition is, indeed, impressive. When the winning entries are announced this fall, I think you'll agree. And when the winners are compiled into the Second RAINBOW Book Of Adventures, I think we can promise you the finest collection of Adventures ever assembled.

— Kevin Nickols

Corrections

A portion of the text for "Bandy, A Challenging Word Game" (June 1984) was left out on Page 142. Part of the paragraph under Table 1 was cut off. The last sentence should read:

> To free the 919-byte RAM area you must do the following; just after you have turned on your CoCo, carefully type *POKE 27,3+PEEK(27):POKE28,154* and press ENTER.

In Tony DiStefano's "Turn Of The Screw" column in the April 1984 issue, a portion of a paragraph was left out. Here is the missing text:

> In order to test the power supply, you will have to beg, borrow or steal a voltmeter (unless you have one already). Okay, unplug your CoCo 2. (If you don't, many sparks will fly.) Solder the two wires that go to the primary side of the transformer . . .

The schematic is not clear on the connections of R1; the end that has a plus symbol next to it should go to +5V. R1, R2 and R5 are listed as 4.7 ohms (Radio Shack Cat. No. 271-8019); they should actually be 470 ohms (271-019). Finally, R3 and R4 (two 15K resistors) are listed as Cat. No. 271-8036; they should be 271-036.

In the "RAM/ROM Upgrade Roundup" (May 1984, Page 49), we stated that Radio Shack's Extended Color BASIC upgrade kit was available by special order and did not have to be installed by a Radio Shack service center. Radio Shack tells us upgrades are only available installed by a service center. We apologize for any inconvenience that this error may have caused.

See you at
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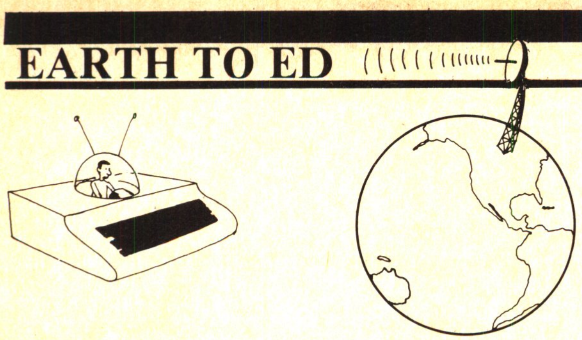
EARTH TO ED



In Search Of Artifacts

By Ed Ellers
RAINBOW Technical Writer

• *I have a 16K CoCo to which I have added the "Monitor Mod" by Richard Kottke (January 1984). The audio and video outputs go to a Zenith ZVM-131 13" medium-resolution color monitor.*

I am very happy with this setup, which gives good color and resolution on the Radio Shack Baseball and Tennis games and the like, but my trouble is with PMODE 4. *I'm working through* Going Ahead with Extended Color BASIC *and, when in* PMODE 4, *all horizontal lines are a nice crisp buff on black, but the vertical lines (or vertical sections of a circle) are alternating blue and red lines. Thinking the trouble is in the monitor, I tried it out with my 19" Mitsubishi TV. Same results, except pink and green rather than red and blue. Doing color adjustments to either set makes no difference (except in the hue of the colors).*

Could the problem be in the computer? Any suggestions?

Art Jones
Cherry Hill, NJ

The colors you're getting are often called "artifacts." They are caused by a quirk of the NTSC color TV system. Since the dots in *PMODE 4* graphics are generated by a master timing circuit, they are locked in step with the reference burst signal that your set uses to lock in a color signal. The dots are at the right frequency to pass into the color decoding circuits in your TV, and the decoder confuses them with the genuine color signal and thinks that they are supposed to be red and blue. (You may have seen this effect on regular TV signals, where someone's jacket may take on some very strange colors.) Many newer sets (though not you. 19" Mitsubishi) have a comb filter which is intended to separate the color and luminance (the black-and-white portion of the TV signal) more effectively, but these circuits don't work on the non-standard signal produced by the CoCo.

There is really no solution to this problem as yet, other than turning down the color control to remove all color from the picture or using an RGB monitor (which would be very difficult to do on the CoCo).

(Ed Ellers, a RAINBOW *and* PCM *staff member, is a self-confessed electronics fanatic whose other interests include science fiction.)*

Crunching Words

• *I am looking for a good word processing program for my CoCo. What do you suggest?*

Laura Morse
American Fork, UT

There are quite a few word processors out for the CoCo; the three that I'm familiar with are *Color Scripsit*, Cognitec's *Telewriter-64* and Softlaw's *VIP Writer*. *Color Scripsit* has an advantage in that it's sold and supported by Radio Shack; the cassette version is sold as a cartridge which means that you won't have to load it from tape each time. *Telewriter-64* runs in any CoCo from 16K to 64K (with or without Extended BASIC) and uses all the available RAM in your machine; it has true upper- and lowercase display in all systems. *VIP Writer*, while somewhat more difficult to master than the others, has an incredible list of special formatting and printing features. Which one is best is a difficult call; my suggestion is to look at all three if you can, and others such as Elite Software's *Elite*Word*, CerComp's *Textpro III*, and Moreton Bay's *CoCo Writer II* as well, to see what each can do for you.

Getting Your Head Straightened

• *In your March 1984 issue you responded to a letter regarding I/O Errors on disk drives. You recommended that the first thing to check was the drive speed calibration, and if that didn't work to try a head alignment kit. Where can I obtain one of the head alignment kits that you mentioned?*

R.E. Kelley
Denver, CO

Aligning a disk drive head is much more difficult than aligning the record/play head on a tape recorder, and I don't recommend it to the novice. But, if you must, check our "Downloads" column in this issue on where to get a head alignment *disk*.

How Many K?

• *I have an E board computer that I purchased with 16K. About five months ago I had it upgraded to 64K by Radio Shack. Since the upgrade, I have not been able to make the* 64K BASIC *(October 1983) or* FORTYK *(January 1984) work. The dealer gave me a copy of the test program issued by Radio Shack (memorandum 0571,81). When I ran the program it told me that I only had 32K. Again I challenged the dealer. He checked with someone in the Radio Shack organization and has since told me that the only way these programs will work is with a disk drive and OS-9.*

Ken Stuparyk
Grande Prairie, Alberta

The test program (which can be found on Page 10 of the May 1984 RAINBOW) checks for a wiring change that is made when Radio Shack upgrades a CoCo to 64K. It is mainly intended to see if a particular computer was upgraded to 32K (using "half-good" RAMs) or to a full 64K, and to check that the correct upgrade procedure was used. It will *not* tell you what kind of RAM chips are in your computer, or if they are good or bad. (If you upgrade a C, D or E board unit to 64K instead of having Radio Shack do it, the program will probably read 32K because the wiring change is generally not done by do-it-yourselfers. Later CoCos and TDP System 100s have this wiring change built in, so the program will give a result of 64K on them.) It's possible that they left out this jumper (which does not affect normal operation), but since you say programs that use a full 64K don't work, I think that they may have left out the addressing modification that allows all 64K to be selected. Ask the service center to open the unit up and examine the wiring. (If you would like to make this change yourself, see my article on upgrades on Page 49 of the May 1984 issue.)

The White and the Gray

• *I just purchased a Radio Shack disk drive (white case). The dealer told me that it would work on the gray Color Computer. It worked fine for a few days, then it stopped. I then took it to a Radio Shack service center, and they said that a white drive wouldn't work on the gray CoCo.*

Dan Schoenbaum
Hollywood, FL

If you are talking about the disk drive and controller package, then the white version will work on all Color Computers. The older model in a gray case won't work on the Color Computer 2 without modification, or addition of a Multi-Pak Interface, because it requires a +12 volt power supply that the CoCo 2 doesn't have. If you are talking about the drives themselves, the white drives should be used only with a new controller and the gray drives with an old controller. (TDP drives and controllers were the same as the older Radio Shack products.) The new drives are made by a different supplier, and the two have different connections.

Upgrading In The U.K.

• *I am an American serviceman stationed in England. Spectrum Projects recently sent me instructions for upgrading D and E boards which do not jive with the contents of my computer. It is an English version, custom manufactured by Tandy for use here (model 26-3004A). Basically, the trouble is that the numbers don't match at the sockets where the 64K chips go. Mine says U25-U32 instead of U20-U27. Besides that, there is no number on the board whatsoever to tell me which revision I have.*

Dale Jones
RAF Greenham Common, England

The A in the model number indicates that you have an NC board (also known as ET, for External Transformer). This board is sometimes called the F board, because it came after the C, D and E boards. You might try the instructions given for the NC board in my article in May, Page 49. (By the way, "custom manufactured" is simply the term preferred by Tandy; every Radio Shack product, wherever it's sold, is "custom manufactured" by or for Radio Shack.)

Big Blue Hand-Me-Down

• *My uncle has recently upgraded his IBM PC for use with a color monitor. He has given me his IBM Monochrome Display. Is there any way I might be able to interface this to my CoCo?*

J. Callahan
Lincoln, NE

It will be very difficult to make the Monochrome Display work with anything other than an IBM PC, since it requires several different signals from the computer (even IBM's new PC*jr* won't drive it).

Monitors on the CoCo 2

• *When I opened my Color Computer 2 to install a video output modification for my Gorilla monitor, I found that the modulator was oriented from front to back instead of from side to side as depicted in the article I was working from. The four terminals I expected to find on the side are nowhere to be found. Help!*

Robert E. McCoy
Mason City, IA

The CoCo 2 has a completely different RF modulator circuit. For a monochrome monitor you can use the circuit described in Tony DiStefano's "Turn Of The Screw" column in May 1984 (Page 188). Using a color monitor will be more difficult, because the CoCo 2 feeds the Y, R-Y and B-Y signals produced by the 6847 video generator directly to the modulator (using the 1372 encoder/modulator chip), which produces the channel 3 or 4 RF signal; the composite signal for a color monitor is not available off the chip. Computerware and Midwest CoCo Systems now have color monitor adapters for the CoCo 2.

Two For The MC-10

• *I would like to know if the MC-10's internal board can be upgraded to 32K or 64K. I would also like to know if there are any books or articles about the MC-10's 6803 microprocessor.*

Gaston V. Webb
Las Vegas, NV

I don't see any way that the MC-10 can be upgraded internally, since the RAM chips it uses are not a normal type like the ones used in the CoCo. As for the 6803, the only book I know of is the programming manual put out by Motorola Semiconductor in Phoenix.

Finding a Map

• *I was wondering if in previous issues you had a complete memory map for the CoCo.*

Joshua Redstone
Hadley, MA

There was, indeed! It was run in four parts in the July, August, September and December 1983 issues of THE RAINBOW.

Transferring Programs to Disk . . . Easily

• *Is there a way to transfer ML programs from tape to disk?*

Mike Gibson
Fenton, MO

If you know what the starting, ending and execution addresses are, in many cases you can just *CLOADM* the program (don't *EXEC* it) and then *SAVEM* it to disk. Two transfer programs I know of are the *Tape Utility* from Spectrum Projects and Tom Mix *Tape To Disk*. There's another aspect to this question, though, read on.

Transferring Programs to Disk Legally

• *Is it legal to transfer copyrighted programs from tape to disk?*

Roger A. Page
Elida, OH

As far as I know, it's a generally accepted practice to make a backup copy of programs you have bought for use on the same machine you bought the program for (but not to give out to others). I don't know that any software company objects to this practice. Of course, this question might be better answered by a lawyer.

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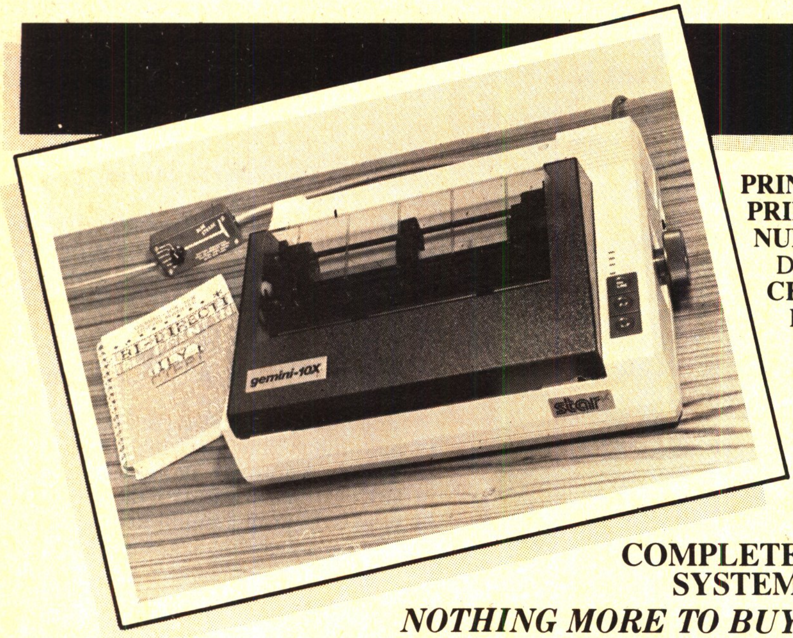

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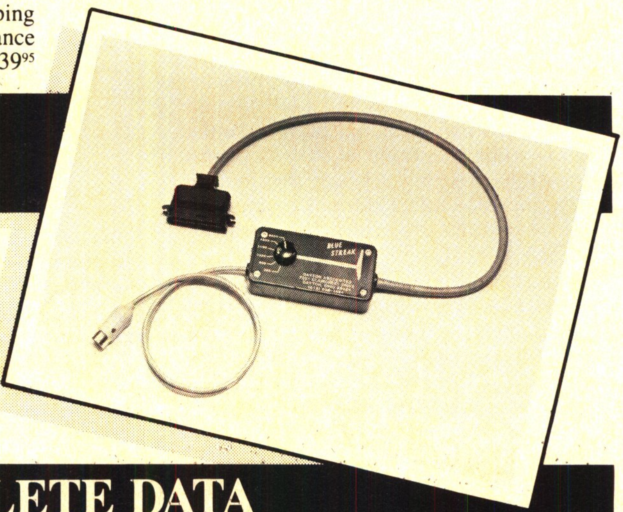

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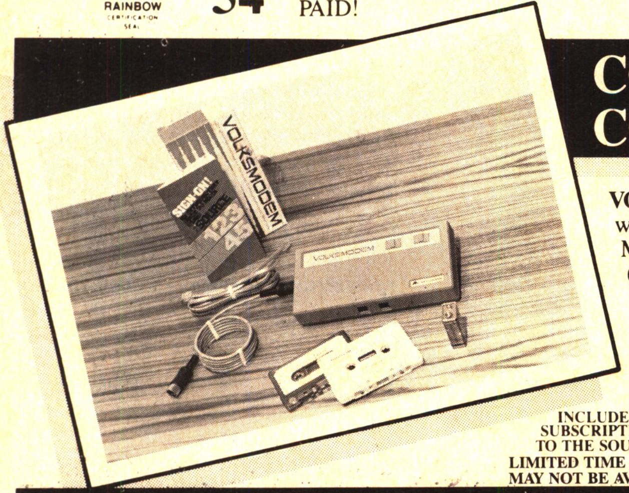

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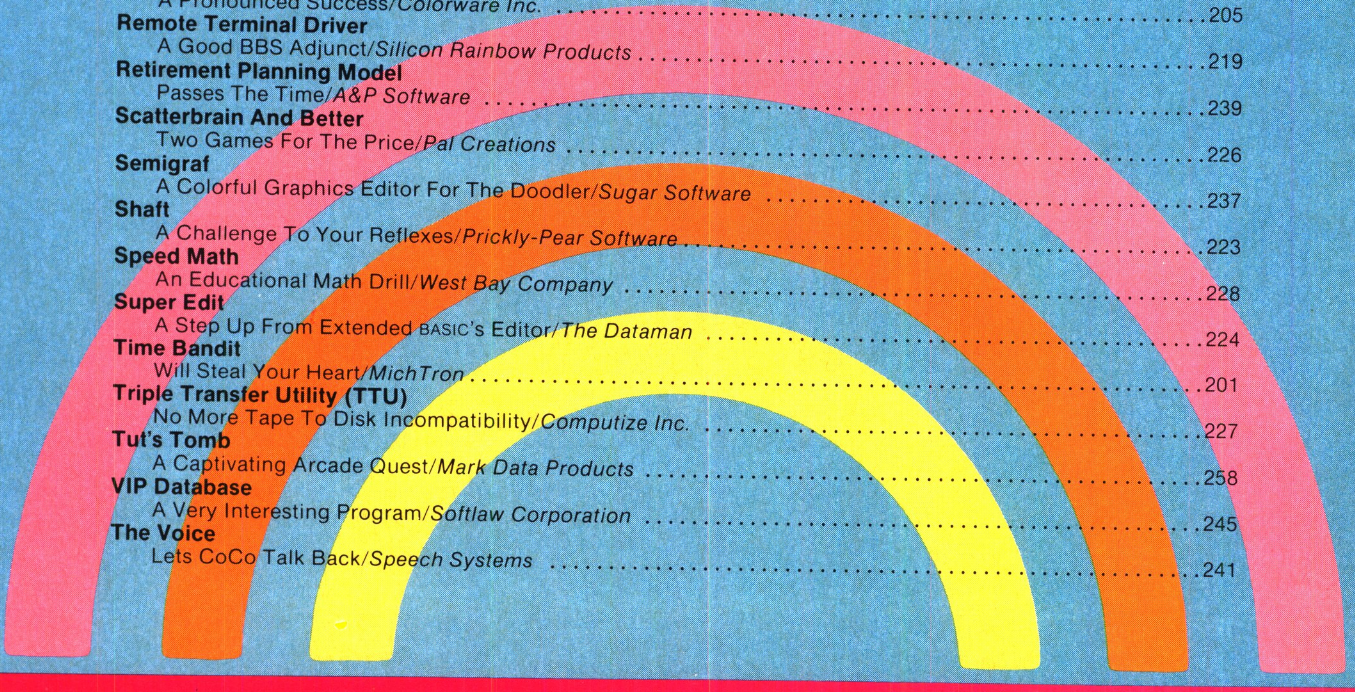

RECEIVED & CERTIFIED

The following products recently have been received by THE RAINBOW, examined by our magazine staff and approved for the *Rainbow Seal of Certification*, your assurance that we have seen the product and have ascertained that it is what it purports to be.
This month the *Seal of Certification* has been issued to:

Castle Alkenshire, a graphics and text Adventure game that requires 32K ECB and one disk drive. As you search for the Moorgondel that lives beneath the fire mountain, you must gain strength and money for weapons by defeating the soldiers and creatures that he sends to stop you. Acesoft Computer Products, 1680 North Page Dr., Deltona, FL 32725, disk $24.95

COLORFORTH V. 2.0, a new version of *COLORFORTH*, a FORTH language compiler. The program operates under all current ROMs, 16K through 64K RAM, and Extended BASIC is not required with the cassette version. Features include a faster *LIST* function, the ability to create and use vectored words, the use of 50 words in addition to the standard figFORTH vocabulary, and a resident figEDITOR. Armadillo Int'l Software, P.O. Box 7661, Austin, TX 78712, $49.95 plus $2.50 S/H

Ancestors, a disk-based genealogical program available in both 16K and 32K versions. The program uses direct access files to create, modify and display up to 500 genealogical records: each record containing 22 fields of data including birth, marriage, death and burial, occupation, military, religion and residence information. Autumn Color Software, 4132 Lay St., Des Moines, IA 50317, disk $39.95

Poker, a 16K ECB slot machine-style poker game. Five cards are dealt, the player discards those he does not want, and replacements are dealt for the discards. A hand of two pair or better wins. Bye George, 14 Dawson Road, Kendall Park, NJ 08824, cassette $6.95

PO-CHEK, a 16K ECB program which assists poker slot machine players in making knowledgeable card selections. It permits the selection of five cards, allows discarding, and then runs as many hands as are requested while giving a breakdown of winning hands. Then the hand can be run again using different discards, allowing for a card selection strategy to be developed. Bye George, 14 Dawson Road, Kendall Park, NJ 08824, cassette $6.95

Scribe Editor CC9, a text editor for use with OS-9. It is used for editing source program files in BASIC09 or other OS-9 languages as well as normal text files. Computerware, Box 668, 4403 Manchester Ave., Suite 102, Encinitas, CA 92024, $39

SP-2 Serial Interface, a serial-to-parallel interface for all Epson printers in the MX, RX and FX series. It is made to be positioned inside the printer and requires no additional power supply or connections. It has selectable Baud rates from 300 to 19,200, allows for seven- or eight-bit ASCII code with any number of stop bits, and comes complete with a 6-foot cord and installation instructions. CNR Engineering, P.O. Box 492, Piscataway, NJ 08854, $49.95; $54.95 with an external switch for allowing use of the printer's parallel port without removing the interface board; and $59.95 for a true RS-232 version

Colorgrade, a 32K ECB disk-based program that allows teachers to keep track of their students' grades on the Color Computer. It supports up to six different class lists, allows entry of individualized grading scales, and will correlate the students' grades in several different manners. Computer Island, 227 Hampton Green, Staten Island, NY 10312, disk $29.95

King Author's Tales, an ECB program designed mainly as a creative writing tool for students. They can create original short stories, design their own title page pictures, and correct and update their stories at a later time. Stories and pictures are saved in files for viewing over and over again. Teachers can also use the program to write reading comprehension short stories through the inclusion of a question and answer feature. Computer Island, 227 Hampton Green, Staten Island, NY 10312, 16K cassette or 32K disk $29.95

Math Invaders, a 16K ECB math program in a game format. Any of the four basic math operations can be chosen on one of four levels and the problems are solved while racing with a descending space ship. Computer Island, 227 Hampton Green, Staten Island, NY 10312, cassette $17.95

Arithmetic Tutor, a 32K disk-based math program that allows students to practice multiplication, long division, factor operations and algebraic evaluation (primarily intended to teach the hierarchy of operations). The program includes a feature that allows the teacher to monitor the student's progress, not only with a "number right" report, but also with a diagnostic listing indicating both the problems that the student answered incorrectly and those that he/she asked the program for help on. Computer Island, 227 Hampton Green, Staten Island, NY 10312, disk $49.95

Graphs Tutor, a 32K ECB Hi-Res program with which students can learn about bar, pie, line and pictographs. Examples and explanations of each type of graph are included and original graphs can be created. Also, a test mode is included for self study. Computer Island, 227 Hampton Green, Staten Island, NY 10312, cassette $19.95, disk $22.95

Quiz Maker, a 32K ECB program that enables the construction of many types of quizzes: fill in the blank, true or false, multiple choice, etc. The questions may be formatted in whatever manner best suits the type of material that is being covered. Computer Island, 227 Hampton Green, Staten Island, NY 10312, cassette $24.95, disk $27.95

First Games, a 32K ECB program of games designed for children ages three to six. Six menu driven games are included: Color Numbers, Memory Shape, Color House, Alphabet Shapes (lowercase), Which is Different, and Counting Blocks. Computer Island, 227 Hampton Green, Staten Island, NY 10312, cassette $24.95, disk $27.95

Text Master, a Hi-Res text utility sporting three character fonts and 24 printing sizes (six for the Hi-Res screen). Character fonts, keyboard and cursor are all user definable and the program offers proportional spacing, fully functional *PRINT@*, underlining, one key *CLS*, and super- and subscripts. It is disk compatible and requires 64K RAM. The Dataman, 420 Ferguson Ave. N., Hamilton, Ontario, Canada L8L 4Y9, cassette $29.95 Can., $23.95 U.S., plus 3 percent S/H ($2.50 min.)

In Assembly Language, an introduction to assembly language on the Color Computer. This book is written for the beginner and is full of examples. Covered are keyboard scanning, I/O, sound generation, string commands, multi-tasking, and even how to make threaded code. Included with the binder-style book is a tape of examples and useful subroutines. The Dataman, 420 Ferguson Ave. N., Hamilton, Ontario, Canada L8L 4Y9, $29.95 Can., $23.95 U.S. plus 3 percent S/H ($2.50 min.)

Graphic Master, a graphics utility requiring 32K RAM and compatible with *Text Master*. It functions solely with the Hi-Res screen and adds 32 new graphics commands. The program includes movable video windows, artifact "DYE," vertical scroll, software sprights with collision testing, a polygon function and three draw modes. And, it fully supports dual page flipping with four flip modes. The Dataman, 420 Ferguson Ave. N., Hamilton, Ontario, Canada L8L 4Y9, $49.95 Can., $39.95 U.S. plus 3 percent S/H ($2.50 min.)

Miner, a 16K ML arcade-type game utilizing the keyboard for play and movement. Working below the ground, you must direct Sid, the miner, as he blasts the coal seams and collects the scattered lumps. The Dataman, 420 Ferguson Ave. N., Hamilton, Ontario, Canada L8L 4Y9, cassette $14.95 Can., $12.95 U.S. plus 3 percent S/H ($2.50 min.)

Screen, a 16K ML utility program that features: automatic line numbering; line by line program listing; motor on/off from the keyboard; and a choice of light or dark orange or green characters on a light or dark orange, green or black screen. The Dataman, 420 Ferguson Ave. N., Hamilton, Ontario, Canada L8L 4Y9, cassette $12.95 Can., $10.95 U.S. plus 3 percent S/H ($2.50 min.)

DEFT PASCAL Workbench, a package comprised of: *DEFT PASCAL*, a language compiler that generates native machine language programs for high-level PASCAL program statements and; *DEFT Bench*, which includes a full screen editor, a macro assembler, an object file linkage editor, and a symbolic online ML debugging aid. DEFT Systems Inc., Suite 4 Damascus Centre, Damascus, MD 20872, disk $199.95

PRO-LOC, a disk-based BASIC utility program designed to limit access to a program or data file stored on disk. In order to load a protected program or file, a six character password must be entered. Dorison House Publishers, Inc., 824 Park Square Bldg., Boston, MA 02116, $15.95

Disk-O-Tier, a thermoplastic diskette organizer that takes up minimum desk space, holds the disks upright, and keeps the labels clearly visible for easy access. It is designed for both 5¼- and 8-inch diskettes. Evans Enterprises, 609 Applehill Dr., W. Carrollton, OH 45449, $9 plus $3 S/H

10KEY, an ML program that turns a portion of the keyboard into a numeric keypad for faster data entry. Also provided are *GEN*, a BASIC program supplied for customizing the *10KEY* program, and *DEMO*, a short program for use in practicing with the numeric keypad. HARMONYCS, 1747 Patricia Way, Salt Lake City, UT 84116, cassette $14.95

Golf Handicapper, a 16K ECB program designed to compute and print golf handicaps for either individuals or teams. A compact printout includes gross and net scores for last play, handicap, last five adjusted scores, and team standings. Don Hug, 1111 Terra Way, Roseville, CA 95678, cassette $35

Willy's Warehouse, an original arcade action ML game requiring 32K for one or two players and featuring a demonstration mode, selectable difficulty, and joystick or keyboard control. Help Willie stock the warehouse while keeping up with incoming orders. Intracolor, P.O. Box 1035, East Lansing, MI 48823, disk or cassette $34.95 plus $1.50 S/H

CoCo Solver, an educational program requiring at least 16K RAM that can set up a model of a problem for quick analysis. Also, it is useful in understanding how computers work and basic computer programming techniques. JTJ Enterprises, Grant's Chapel Rd., Route 1, Adams, TN 37010, cassete $79.95

Aldaron, a 32K Adventure game in which the Adventurer must rescue the elven prince, Aldaron, from an evil necromancer who has abducted him. His father, the king, has promised treasures beyond belief to the mortal who returns his son to safety, but many have tried before and all have failed. Jade Products, 519 N. Scott, Wheaton, IL 60187, cassette $25.95

Grey Lady, a Hi-Res arcade-type game program requiring 32K ECB and one joystick. When used with a voice pack using the Votrax SC-01 synthesizer chip and Del Software's *Translate* program, the game becomes a talking program as you command a submarine and try to keep the sea line of communications open for friendly shipping. JARB Software, 1636 D Ave., Suite C, National City, CA 92050, cassette $19.95, disk/Amdisk $24.95 plus $3 S/H

Flight Simulator, a 16K simulation program that turns the CoCo into a small aircraft. Featured are 10 instrumentation displays and full keyboard control of the plane. Majestic Software, P.O. Box 91, Westland, MI 48185, cassette $15 plus $2 S/H

Color Stronghold, a 32K arcade-style game for one or two players. The shield that keeps the atmospheric radioactive debris from destroying your city is failing, and you must command the mobile energy catapult to stop the debris from breaching the barrier. MichTron, 1691 Eason, Pontiac, MI 48054

Intercept 4, an arcade-type game requiring 32K and two joysticks. It features three separate screens that each scroll in all four directions. Defending your planet from an alien attack, you must destroy their spacecraft, transport to the planet's surface to destroy the aliens there, and then go up against the mother ship in your own vessel, the Intercept. MichTron, 6655 Highland Rd., Pontiac, MI 48054, cassette $27.95, disk $29.95

Worlds of Flight, an ML "view" oriented flight simulation requiring 32K and two joysticks. The pilot's position can be determined by viewing surrounding landmarks rather than by instrument display alone, although instrument procedures may be practiced as well. Tom Mix Software, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette $29.95, disk $32.95 plus $1.50 S/H

KEEP-Track, a general ledger accounting system that can fulfill the accounting needs of the small business or the home. The system uses the "double entry" accounting method and allows the operator to create account categories for assets, liabilities, income, and expenses, then supports printouts for a balance sheet, an income statement, general journal, general ledger, and trial balance. The Other Guy's Software, 875 South Main, Logan, UT 84321, disk $14.95

AMT, a program that will test different types of loans, their outcomes pertaining to total cash out, and the breakdowns of the payments (interest, principal, balance, total interest to date, total principal to date and total payment to date). It is accurate to nine digits, including the cents column, and will also compute negative amortizations and balloon payments. The Other Guy's Software, 875 South Main, Logan, UT 84321, disk or cassette $14.95

Kingdom of Bashan, an Adventure game requiring 32K RAM and ECB. The object is to enter the kingdom, gather 10 treasures and return to the starting point. A tipsheet is included. Owls Nest Software, P.O. Box 579, Ooltewah, TN 37363, cassette $17.95

Pilgrim's Progress, a Christian Adventure game requiring 16K ECB in which the Adventurer's progress is directed away from the city of destruction and toward the Celestial City. Important Biblical doctrines are examined as the player proceeds. Quality Christian Software, P.O. Box 1899, Duncan, OK 73533, cassette $17.99

Church Time, a light hearted, non-theological Adventure game requiring 32K ECB. You're almost late for church and, to top it off, you forgot your Bible. Rushing back to your house you find that the front door has bolted behind you, but you must get inside before the church bell tolls. Quality Christian Software, P.O. Box 1899, Duncan, OK 73533, cassette $10.99

3Game Pack #3, a 16K ECB program containing three multiple choice Bible-based games and quizes: *Sword Drill #2*, a game in which given scriptures are matched to the correct Bible passage; *Who Did That #2*, a game in which a Bible character is matched to descriptions of his deeds; and *Bible Quotes #2*, a quiz in which the proper character is matched to a quotation from the scriptures. Quality Christian Software, P.O. Box 1899, Duncan, OK 73533, cassette $10.99

Christmas Quiz, a 16K true/false, multiple choice question and answer game based on the Gospel's account of the birth of Jesus Christ. After each question is answered, the program will give the correct answer and the proper scripture references. Quality Christian Software, P.O. Box 1899, Duncan, OK 73533, cassette $9.99

TRS-80 Color Computer & MC-10 Programs, by William Barden Jr., a book containing everything from tutorial programs for young readers to financial programs for businessmen. Each program also includes a

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brief description and step-by-step instructions. Radio Shack Stores nationwide, Cat. No. 26-3195, $5.95

Androne, a 16K arcade-style game in which your computer is being invaded by Data Bugs which are feeding on its memory cells. If the bugs are not destroyed immediately, your computer will lose its entire memory bank. To debug your computer, you must employ the services of Androne, a user-controlled robot, to search each memory cell and destroy the bugs. Radio Shack Stores nationwide, Cat. No. 26-3096, ROM Pak $19.95

The Adventurer's Handbook, a guide to role-playing games by Bob Albrecht and Greg Stafford. This book takes you into the fantasy world of role-playing games in which the players create and control characters who live their imaginary lives in a specially created game land. You can base your games on such well-known fantasies as Tolkein's Middle Earth, Ursula Leguin's Earthsea or Moorcock's Young Kingdoms, or you can make your own heroes. The handbook covers creating a character, getting to know your character and things your character can do as well as games and sources. Reston Publishing Company, Inc., 11480 Sunset Hills Rd., Reston, VA 22090, $14.95

XPNDR1, a CoCo expander card with a gold edge connector that plugs into the CoCo cartridge connector. Signals are located on the bottom. The 4.3 x 6.2-inch glass/epoxy card is drilled for ICs and components. Robotic Microsystems, Box 30807, Seattle, WA 98103, $19.95 each or two for $36

The Presidents of the United States, an ML educational program for grades five and up. It includes a study mode, a multiple choice game, and an "identify the Presidents" game for high school students and older. Sugar Software, 2153 Leah Lane, Reynoldsburg, OH 43068, 16K/32K cassette $24.95, 32K disk $29.95

The CoCo Calligrapher, a special purpose text processor requiring 32K ECB and a bit mode printer. It allows 17 lines of editable text before being output to the printer in one of three print styles — Old English, Gay '90s or Cartoon. The letters are variably spaced and can range up to a 36 point size (½ inch). Sugar Software, 2153 Leah Lane, Reynoldsburg, OH 43068, cassette or disk $24.95

Flying Tigers, an ML arcade-type game requiring one joystick and featuring Hi-Res graphics and five levels of difficulty. After being ambushed by alien fighters, all ten of your squadron members were shot down and ejected onto a small asteroid. To defend them, you must destroy the attackers that are closing in. Sugar Software, 2153 Leah Lane, Reynoldsburg, OH 43068, 16K cassette $24.95, 32K disk $27.95

DO-FILE, a program for building and maintaining files of the user's own design. It allows the construction of files as tables of horizontal rows and vertical columns with as many as 255 characters in each record and 300 records in any one file. Files can be sorted, specific items can be searched for, and storage can be accomplished on either tape or disk. Also included are *FIX-FILE*, a companion utility for expanding fields or adding new fields to existing files, and *TRY-FILE*, a sample data file for learning the procedures. Solid Software, P.O. Box 712, Levittown, PA 19058, cassette $19.95 plus $2 S/H

The Sector Inspector, a disk "zap" utility requiring 64K RAM and Disk Extended BASIC. The program can alphabetize, backup and print out directories; repair crashes; *LLIST* BASIC programs; name disks; read in and edit 23+ grans; three-swap backups and more. Sonburst Software, 233 S.E. Rogue River Hwy., Grants Pass, OR 97527, disk $29.95

The Factory: Explorations in Problem Solving, a new educational program offered for the 32K Color Computer with one disk drive. Designed for ages nine to adult, the program helps children learn how to break down a problem into its parts and then solve each part . . . step by step. Designing an assembly line to solve the problems develops their ability to plan ahead and to reason visually. Sunburst Communications Inc., Pleasantville, NY 10570, disk $39.95

Teasers by Tobbs: Puzzles and Problem Solving, a program of math puzzles for ages eight to adult. The program aids in practicing math problems while developing the ability to break the problem into its components, select the part to solve first, and then find the solution. Sunburst Communications Inc., Pleasantville, NY 10570, disk $39.95

The Pond: Strategies in Problem Solving, a program designed for children above seven to teach about experimentation. Playing the game, they gather information, make and test assumptions, and learn to recognize patterns and reason visually. Sunburst Communications Inc., Pleasantville, NY 10570, disk $39.95

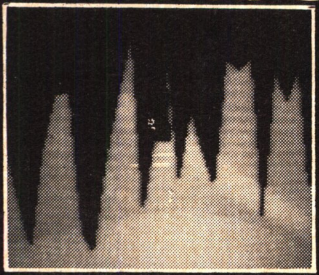
Phantom Memory, a 64K ML program to access the "phantom" 32K RAM for BASIC programs. The program also establishes a new type of dimension and variable that utilizes the additional storage space. Trillium Systems, 67 King St. East, Oshawa, Ontario, Canada L1H 1B4

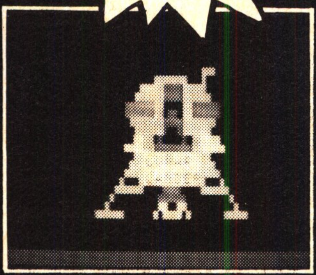
The *Seal of Certification* program is open to all manufacturers of products for the TRS-80 Color Computer, the TDP-100, or the Dragon-32, regardless of whether they advertise in THE RAINBOW. By awarding a *Seal*, the magazine certifies the program *does exist*, but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW's reviewers for evaluation.

— Kevin Nickols

SHELL *software*

ML AUTHORS TOP ROYALTIES PAID





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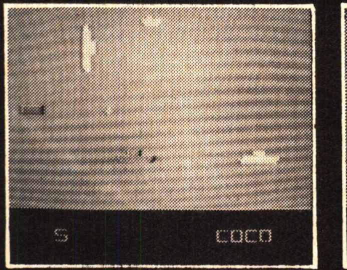

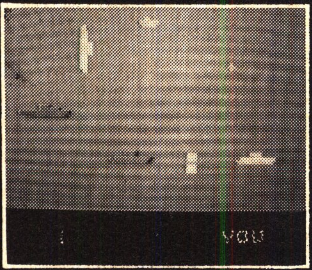

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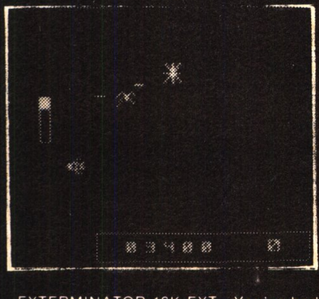

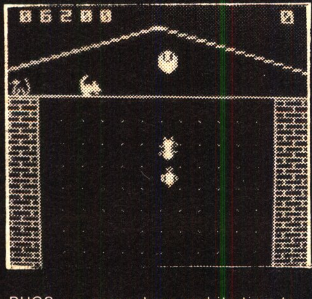

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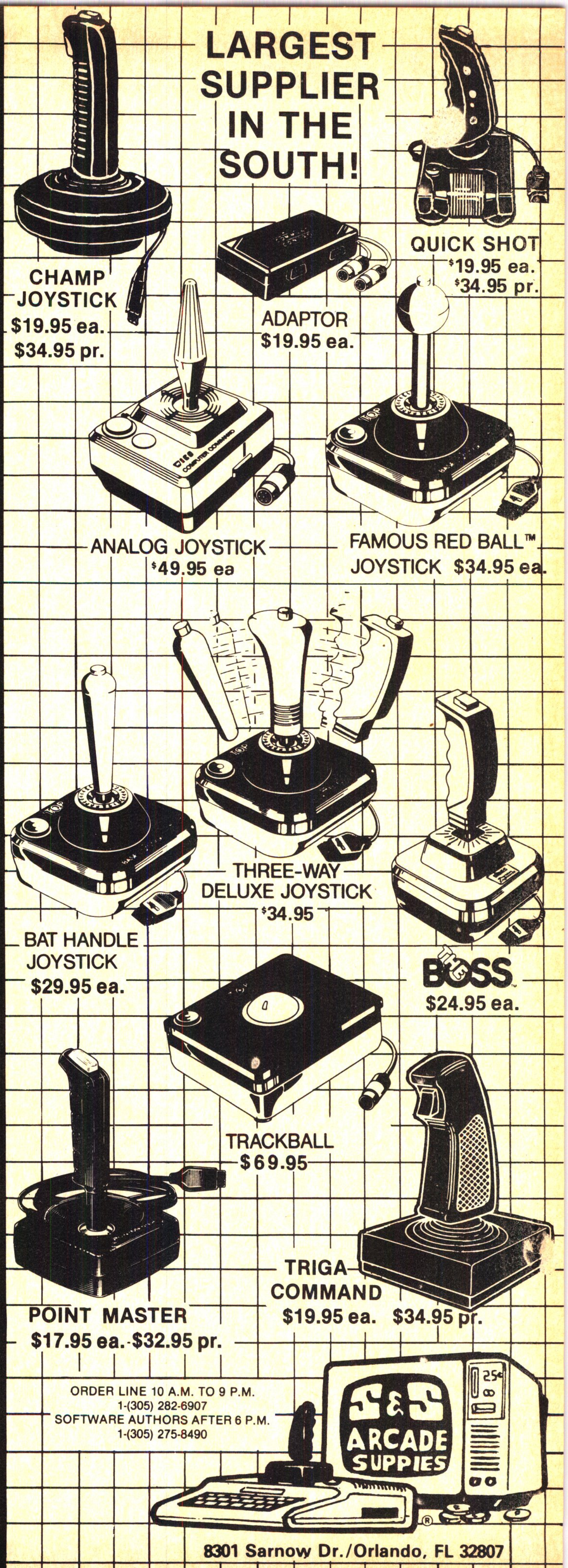

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REVIEWS

RETIREMENT PLANNING MODEL

Editor:

As author of the *Retirement Planning Model* (A&P Software), I wish to thank Mr. Howard Ball for his review (July 1984 RAINBOW). While the review was generally favorable, Mr. Ball felt rather strongly that the model is overpriced. As an author/vendor, I would like to share a couple of my views regarding software pricing.

First, we made the decision to market the model realizing that we were offering a fairly specialized product which automatically limits the potential sales volume. Software pricing decisions must consider the mathematics of potential volume, advertising and production costs, and some compensation for a considerable time investment. When all of these factors are considered, the low-volume specialty product must be priced somewhat higher to provide a reasonable profit. I would like to think that there is a genuine need for special interest programs, but there must be an economic incentive to bring them to the market.

My final point is the relationship between value and cost. A planning tool such as the *Retirement Planning Model* will not provide hours of entertainment while moving the frog across the busy highway and the treacherous stream, nor will it print the mailing list for your club newsletter. It can, however, provide valuable guidance toward planning a properly funded retirement. If the *Retirement Planning Model* helps insure its purchaser of making the proper retirement planning decisions, its potential value makes the cost trivial. While cost is always a factor in making purchase decisions, the ultimate test should be the potential value of a product.

Independent authors with specialized knowledge have much to offer in the realm of analytical software. But there must be an incentive. Until recently, a lack of business software has been one of CoCo's shortcomings. This gap will continue to disappear if the market understands the basic economics of limited volume products and recognizes the concept of value/cost relationships.

Paul G. Parker
A&P Software

THE ANSWER

Editor:

I first want to thank you for reviewing our product, *The Answer,* which was reviewed April 1984, Page 260, and I want to correct a few inaccuracies.

The major mistake the reviewer made was stating that *all* machine language programs must be patched to work with *The Answer.* This is simply not true! The only programs that need to be patched are those with their own output to printer routines. *Any* machine language program that uses BASIC's printer routine will work without modification.

A good example of this is *Elite*Word.* This fine word processor uses BASIC's output character routine, and works nicely with *The Answer!* It is really nice to see the program dump the text to the printer at the printer's fastest speed using parallel, rather than serial (or converted serial) transmission.

My next disagreement is with his criticism of *The Answer* default rate in the terminal software. Our default value works with all the BBS systems that we know of, as well as the *Source* and CompuServe. In any event, the default value is easily reset. Our main reason for including terminal software was to provide the means for printing *while online.* There is *no* other system that will allow you to print *online,* and allow you to use your disk drives!

With the *CoCo-Term,* you can save and load to disk or tape! You can grow into our system, instead of out of it.

Now for some comments about our new version of *The Answer* which features a short ribbon cable connection to the ROM pack port. This not only solves the problem of stability, but it allows *The Answer* and the disk controller to lie flat on the table parallel to the CoCo. This will take up much less space.

The 12 volt pilot light will be replaced so it will work with the CoCo 2. (There was no CoCo 2 when *The Answer* was originally designed!)

We are also considering a provision for a larger ROM chip, which would allow us (or the end user) to place an often used program in the ROM. You would be able to toggle between our software (*CoCo-Term,* the *Monitor,* and print driver routines), and the print driver routines and a word processor or spreadsheet, etc.

While *The Answer* won't win any beauty contests, you will be hard pressed to find a hardware/software combination that provides as many useful functions in one device at *any* price.

John Ross
MCSI, Inc.

COLORTAC

Editor:

I have just finished reading the April 1984 issue of THE RAINBOW and as usual you have an excellent magazine. I must disagree with the review (Page 236) of *Colortac* written by A. Buddy Hogan. I have a copy of this program and the program *Menu* that Mr. Hogan also mentioned and I have found them both to be excellent as well as being well worth the price. I also am the owner of BASF 6106 drives. Most of the people I know who have Radio Shack drives have had speed problems with them.

It is very unfortunate that Mr. Hogan did not receive the documentation to accompany *Menu,* as this is really quite a program. I do not know what revision Mr. Hogan received, as I have revision 2.0. This program is designed to be a disk management tool for those of us who do not have the total contents of each of our disks memorized. I have found this program to be very useful. It is the easiest method of checking each disk for that program that you know you have but can't remember where it is. Yes, there are a few of us sane people here who run other programs from *Menu!* I have a copy of *Menu* on each disk that I own and use it for this purpose quite often.

The documentation for both programs is short but well written. I feel that both of these utility programs are a welcome addition to any disk library and would recommend them to anyone.

J. Wright
APO, S.F

BUSINESS MANAGER

Editor:

I have received the draft copy of a review of my product *Business Manager*. [The review of *Business Manager* appears in this issue of THE RAINBOW.] As taken in its entirety, I thought the review was favorable, but I also thought the reviewer, Mr. James F. Taylor, missed the whole point of the product.

Business Manager was developed by me as a tool for a small business. It can be used with a tape system or a disk system, and with an optional printer. The user can use *Business Manager* with a minimum system, then as the user adds disk drives and printers the program will still be usable without modifications.

The statement I take issue with is that Mr. Taylor does not recommend *Business Manager* with a disk system because the transactions are lost when you move your accumulators to the yearly statement.

1) Before moving the accumulators to the yearly statement, the user could print out a list of all the transactions and, therefore, have a hardcopy of all transactions.

2) The transactions could also be printed out by account classification.

3) Before moving the accumulators to the yearly statement, the user could save the month transactions to tape for future use.

Business Manager was designed to save data on disk or tape so the disk user could save past data on tape instead of disk for storage.

The printouts are simple, but adequate to save memory. The printouts use the screen format for the hardcopy.

As stated by Mr. Taylor, this program is about 10.5K in length and, therefore, it was not possible to get fancy because of memory considerations.

Lastly, I would again like to say the review was somewhat satisfactory. Mr. Taylor called it like he saw it, only in some sections of the program he and I saw it differently. *Business Manager* is a program designed to help a *small business* and as such the program is simple, but it also contains everything needed to keep track of income and expenses.

John Nyitray
80 Custom Software

Editor:

The only real issue brought out in Mr. Nyitray's rebuttal is that he does not agree with my opinion that the program is not convenient for disk system owners. However, he does deem it necessary to devote one-third of his rebuttal to defining the ways he has perceived to get around the very weakness which I mentioned in my review. Has the concept of a user without a cassette ever occurred to him? He states right in the rebuttal that he planned the product for a cassette system which may be upgraded with a disk and printer.

I can see no real point in Mr. Nyitray's rebuttal letter, given the favorable nature of my review, except to announce that he has fixed the real "bugs" in the program which I apparently pointed out to him in my review, and which any good programmer would have found with minimal testing.

J. F. Taylor
Meriden, KS

EVERYONE'S GUIDE TO BASIC

Editor:

To us, the most striking thing about the review of *Everyone's Guide To BASIC* is that it does not discuss the book itself, but instead addresses the question of whether programming should be taught as a machine-specific process or as a generic process. The writer's obvious opinion is that programming is always machine-specific. This is a valid opinion, but it seems misplaced in a product review. It would seem more appropriate to point out the book's approach and then let the reader decide if this is the type of book he or she wants to use.

Everyone's Guide To BASIC is intended to be a simple introduction to what BASIC programming is and how it works. It is not intended to deal with "subtleties." If anything, it is meant to offer an even simpler, clearer, more understandable explanation of BASIC than is provided in many computer user guides.

Altogether, this review doesn't provide the type of information a potential buyer might want. The book's intended audience is novice computer owners (and users) who would like to learn how to write simple programs in BASIC, and these people would probably like to know whether or not the book adequately covers the BASIC language, whether or not the presentation is clear enough for novices, whether or not the book is logically organized, and how the book compares to other BASIC primers. None of this information is provided in the review, having been pre-empted by the writer's opinions about programming books in general.

We feel that *Everyone's Guide To BASIC* is a good book for anyone who would like to learn the basics of programming and write simple programs in BASIC.

Estelle Weber
Consumer Guide Publications

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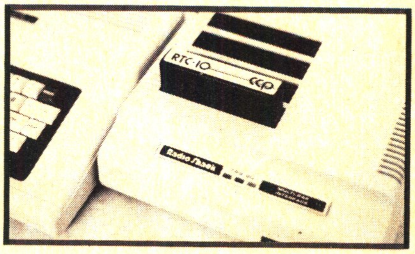

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Time Bandit Will Steal Your Heart

A cowboy pulls his gun on a dinosaur out of the past. This is the first of many strange things you will find in *Time Bandit*, and this is only the cover. The program is written by Bill Dunlevy, author of *Dungeon Escape*, *Clash*, *Cyborg*, and *Jovian* with assistance from Harry Lafnear. A very sincere letter from the author is included in the package.

> "All Of Space Is Your Garden, And All Of Time
> Is Yours In Which To Harvest It.
> You Are The Time Bandit!"

This is the code of the *Time Bandit* and it is found at the beginning of the excellent documentation, tips, and loading instructions. *Time Bandit* boasts more than 20 different locations each with 16 of their own unique playing levels.

Time Bandit includes three major areas; Western World, Fantasy World, and Space World. Travel begins every time in what is called the Timegates. You must acquire a key to unlock the door to Western, Space, and Fantasy World so that you can reach one of the more than 20 play areas.

Your movement is controlled by the joystick or the keyboard, the joystick being easiest for me. In the Timegates you can fight off monsters, get treasure, get your key and escape to freedom. There are three monsters in the Timegates — a blue mutated sloth, something that looks like a land-born jellyfish, and a giant crab. If any of these touch you, you'll lose five of your 100 power points. Next to Timegates' name you will see '1A' in blue letters. This means you are in the first phase of the Timegates, skill level one. The next time you are at the Timegates it will be first phase, skill level two. There are four phases and four skill levels of the Timegates. Each phase has a different map of the Timegates and they are all progressively harder. After leaving the Timegates you can enter the realm of medieval battle in one of seven different locations in Fantasy World. If you wish you can go to any of seven different locations in the realm of ghost towns and gunslingers in Western World. You still have seven choices remaining in Space World, the realm of terrible mutated space creatures and supratechnology.

In Fantasy World you can choose from seven different places. You can go through a castle, a ruin, a maze, an arena and others. There are three major monsters in Fantasy World. First there are these colorful, swirling entities, then there are these ominous, blinking, red, omniscient eyeballs that even have moving pupils that look left and right to see which way to go, and lastly there are the Killer Smurphs. They look exactly like the Smurfs we see on TV except they have tiny little malicious grins on their faces. I enjoy smurphing them.

Western World has an array of places you can go, ranging from a ghost town to a jail. You have three major types of monster in Western World. First, you have these cute little ghosts that fly around. Second, there are outlaws (or maybe they are sheriffs and you are the outlaw) who walk along arms akimbo. Thirdly, there are the red scorpions.

In Space World — from the Enterprise to the insidious grid — you combat three types of mutated space monsters who I won't try to describe.

When traveling from screen to screen I explained earlier that you must have a key to unlock the gates. Well, some screens have two keys and two locks. You must get one key and open one lock before you can get the second key — you can't carry two keys at once.

The *Time Bandit's* life relies on regeneration of the power points he loses when assaulted. You regenerate one point of power per 100 points of score, to a maximum of 100 power points at a time. The easiest way to renew your power is to grab treasures. The first in each screen is worth 100 points, the second is worth 200 and the third is worth 300 points. If your power runs below zero, you die. Because of the nature of the time travel you do as a time bandit you can only stay in one place for a certain length of time. When that time runs out your power gauge drops like a rock!

When playing *Time Bandit*, you can use either the arrow keys, or the joystick. Either way you should remember that the 'P' key pauses action until you hit ENTER to resume play.

Time Bandit is by far the best game on the Color Computer I've ever seen and it is sure to be the biggest thing to hit the CoCo since AC power. I look forward to future programs by Mr. Bill Dunlevy.

(MichTron, 1691 Eason, Pontiac, MI 48054, $27.95 tape, $29.95 disk)

— Scott Sehlhorst

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Advanced Editor
A Fun, Handy OS-9 Program

By Dale Puckett

A lot of programmers would rather work with a line-oriented editor than a screen editor. If you fall in this category, you'll want to take a serious look at Computerware's *Advanced Editor*, the company's OS-9 version of *Scribe*. It works a lot like the editor from Technical Systems Consultants (TSC) that many of us cut our teeth on and is a big improvement over the editor supplied with OS-9. It is very handy for writing BASIC programs, assembly language programs and can also be used for writing short letters or documentation. [Computerware recommends using this programming editor with FHL's *O-Pak*, and *Advanced Editor* will auto-load *O-Pak*.]

Although it is line-oriented, *Advanced Editor* lets you manipulate characters in a special edit mode. You can insert characters, delete characters, type over characters and even break or join lines. It is very easy to use and I was able to do some rather complicated editing after working with *Advanced Editor* for only an hour.

Advanced Editor has three modes: Input, Command and Edit. You use the Input mode to enter your text. You may type up to 250 characters on a line and enter as many lines as you like. You may also edit characters within the line using special control character commands while entering text. You return to the command mode by hitting the Escape key or the Rubout key.

You get to the line Edit mode by typing the letter 'E' while in the command mode. Here is a listing of the special control commands. Remember, they only have an effect on the text in one line.

CONTROL E —	insert characters
CONTROL S —	delete characters
CONTROL B —	break a line into two or more lines
CONTROL F —	append two lines together
CONTROL A —	copy the remainder of "old" line
CONTROL X —	ignore previous edits and start over
CONTROL V —	backspace a word
CONTROL H —	backspace one character
CONTROL I —	copy one character from "old" to "new"

Advanced Editor's line editing functions are easier to use than they are to explain. To use them, you move to the line you want to edit while still in the command mode and then type 'E'. *Advanced Editor* will then print the line on your terminal and move the cursor to the front of the next line below it on the screen. You then strike the [CONTROL][I] or right arrow key and you'll see the characters from the original line reappear on the new line. You strike this key until you get to the point you want to make a change and then use one of the other control keys. It's kind of fun to watch it work once you get used to the idea it is not a screen editor.

From *Advanced Editor's* command mode, you can jump to the top or the bottom of your text, move through the text a line at a time, go directly to the desired line by typing a number, or go to a line that contains a target string. We won't detail their operation here, but disk-oriented commands available from the command mode include:

LOAD SAVE WRITE READ LOG
DOS MORE DO

Advanced Editor's DO command is of special interest because it lets you call OS-9's Shell and execute another utility while you are editing a text file. For example, you may be writing a story and want to watch a utility perform just before you describe it. WRITE is also handy because it lets you write a specified number of lines to a disk file. It would be handy for creating boilerplates which can be inserted in other files later with the READ command.

Personally, I've been spoiled by working with a screen editor for several years. But, *Advanced Editor* brings back fond memories of those early days with TSC's editor on the SWTPC 6800 box. *Advanced Editor* is a fun editor to use.

(Computerware, Box 668, 4403 Manchester Ave., Suite 102, Encinitas, CA 92024, $39)

Hint . . .

Negative Offsets

You *can* load machine language programs from tape or disk with an *effective* negative offset, that is, to an area of memory *lower* than the specified starting address. The snytax for loading with offset is *LOADM* "TITLE",XXXX (or *CLOADM*), where XXXX is the offset. Negative numbers won't work for XXXX, but offsets that appear to place the program *beyond* the end of memory (65535) will "wrap around" so that 65536 is memory location zero, 66636 is 1000, etc.

Example: A machine language program on tape has a starting address of 16000. To offset load it so that it starts at address 10000, calculate the offset as follows:

1. Find the *negative* offset.
   NEGATIVE OFFSET=NEW ADDRESS-ORIGINAL ADDRESS
   NEGATIVE OFFSET=10000-16000=-6000
2. Add 65536 to the negative offset.
   OFFSET=NEGATIVE OFFSET+65536
   OFFSET=-6000+65536=59536
3. Load the program with the calculated offset.
   CLOADM"TITLE",59536

The program will offset load 6000 bytes lower than the address specified on the tape.

Barry E. Becker
Smithtown, N.Y.

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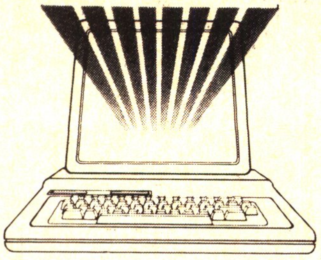
SUPER SCREEN



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COMBINE TEXT WITH HI-RES GRAPHICS

You can now write truly professional looking programs that combine text with hi-res graphics. Super Screen allows you to create graphics displays with the Basic LINE, DRAW and CIRCLE statements and then notate the graphics with descriptive text. You can even use PRINT @ if you wish for greater programming convenience. Super Screen's versatility will amaze you.

PRINT @ IS FULLY IMPLEMENTED

The PRINT @ statement is a valuable asset to the programmer when formatting text on the screen. The standard Color Computer will report an error if you specify a location higher than 511 but Super Screen allows locations all the way to 1223! You get a big screen and a powerful formatting tool as well. Of course, Super Screen also supports the CLS command allowing you to clear the big screen using standard Basic syntax.

ON ERROR GOTO

That's right! Super Screen gives you a full implementation of ON ERROR GOTO including the ERR and ERL functions. Now you can trap errors and take corrective action to prevent crashed programs and lost data using the same standard syntax as other computers. The ON ERROR GOTO capability overcomes a serious deficiency of Color Computer Basic and greatly improves your capability to handle sophisticated tasks. All well written, 'user friendly' programs use error trapping techniques and yours can too! Now that's power!

AUTO KEY REPEAT

No more frustration as you edit a long line in your Basic program; just hold the space bar down and automatically step to the desired position in the line. Need a line of asterisks? Hold the key down and auto repeat will give them to you. Those of you who spend many hours at your keyboard will appreciate this outstanding addition to Super Screen's long list of impressive capabilities.

CONTROL CODES FOR ADDITIONAL FUNCTIONS

Super Screen recognizes several special control code characters that allow selection of block or underline, solid or blinking cursor and other functions. You can 'Home Up' the cursor or you may erase from the cursor to the end of a line or to the end of the screen just like many other computers. These special codes give you an extra dimension of versatility and convenience that put Super Screen in a class by itself.

AND MORE GOOD NEWS...

Super Screen comes with complete, well detailed instructions and is available on cassette or disc. It adjusts automatically to any 16K or greater, Extended or Disc Basic Color Computer or TDP-100 and uses only 2K of memory in addition to the screen memory reserved during power up. Guaranteed to be the most frequently used program in your software library...once you use it, you won't be without it! Super Screen's low price will really please you; only $29.95 on cassette or $32.95 on disc!

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The MDP order entry system is a family of programs which operate interactively by means of a "menu" selection scheme. Up to 900 products may be defined and a single disc system can hold over 600 transactions. When the operator selects a task to be performed, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary paperwork including shipping and invoice forms, daily sales reports, a monthly (or other period) sales report and a receivables report.

The MDP system:

- Is accurate, user friendly and simple to use.
- Is easy to customize for specific user requirements.
- Produces a traceable invoice.
- Handles receivables as well as closed orders.
- In capable of future expandability.

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ACCOUNTING SYSTEM

The Mark Data Products accounting system is ideal for the small businessman needing a fast, efficient means to process income and expenses, prepare detailed reports and maintain most of the information required at tax time. The system is a family of programs which operate by means of a "menu" selection scheme. When the operator selects a task to perform, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary accounting reports including a transaction journal, a P&L or income report, an interim or trial balance and a balance sheet.

Up to 255 separate accounts may be defined and a single disc system can hold over 1,400 transactions. This system automatically enhances the monitor screen to a 51 character by 24 line display. 32K of memory is required along with an 80-column printer and one or more disc drives.

The MDP system:

- Is accurate, user friendly and simple to use.
- Is easy to customize for specific user requirements.
- Immediately updates the chart of accounts.
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- Includes end of period procedures.
- Is capable of future expandability.

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There's More Than Meets The Eye With *Master Design*

By J. Michael Nowicki

Now here's a unique idea for those of you who do a lot of letter writing and would like to add that personal touch of a custom designed letterhead. This package is, in essence, a graphics screen editor but with an interesting feature that allows you to access and print your graphics letterhead from within the *Telewriter-64* word processing program or from within a BASIC program.

System requirements include a 32K CoCo, one disk and a dot matrix printer with graphics capabilities. The documentation consists of a 17-page manual in a simple and easy to read format. The program is not copy protected and the very first user instruction is to make a backup disk for actual use and store the original for safe keeping.

First you have to configure the main program to work with your dot matrix printer because not all printers with graphics functions use exactly the same control codes. The default codes are set up to work with just about any Radio Shack printer and specific instructions are given for Okidata, Epson, C. Itoh and suggestions on how to interface other models. I had no trouble at all in getting the program to work with a Radio Shack LP VII, DMP-200 and a Gemini-10X. Changes in printer codes are made by changing variables within BASIC lines and you then save the revised program to disk as your standard. *RUN MENU* and ENTER to run the boot program that accesses the *Master Design* and *Letterhead Utility* program.

Within *Master Design*, which is the main program of this software package, there are two main modes of operation: the editor mode for placing text characters on the screen using the keyboard, and graphics mode to overlay graphics designs using Extended BASIC commands called up by simple keyboard commands. All *PMODEs* are available using any color set but for letterheads and graphics design, *PMODE4* offers the highest resolution and best results when the finished product is dumped to your printer.

The editor is like a mini word processor in that you can enter text on the graphics screen using any or all of 30 sizes of characters. There is one base character set that can be customized to achieve effects like three-dimensional block letters, shading, background patterns and much more. Exploring all the combinations in various modes will give varied and impressive results but they are still all based upon the one and only one base character set. There appears to be no means of designing and calling up your own base character set from the keyboard. Inclusion of this function would have magnified the power and usefulness considerably, but it is possible to use the graphics editor to create your own font styles and assemble them into words using the *GET/PUT* function keys.

From both modes you have a variety of command keys to change *PMODEs*, modify font size and style, load and save graphics screens to disk, change the starting graphics page and several other functions. The keyboard response is a little sluggish when you use larger or more detailed fonts because BASIC is used. You have quite a bit of control over exact placement of the text cursor which consists of a flashing underline. You need this fine control when you switch back and forth between font sizes and getting them right on the money can be a little tricky.

In the graphics mode you have two cursors controlled by the arrow keys. Which cursor is being moved at the time depends on which was selected with the 'X' key. In case the eyes get tired and you lose place of where the cursors are, you press 'O', which reveals a semi-graphics screen with big blocks to indicate the cursor locations. When you release the key, the graphics screen switches back with your eyes still on the marked areas. Nice feature. You can create boxes, lines, circles, shaded areas, paint them and even have fine cursor control over individual pixels. Anything you have done with the draw command can easily be undone with the erase command.

Work sheet screens can be saved to disk or tape for future use. Each screen file can be given a name and saved in binary format and disk directories may be viewed before loading.

Using all these features combined, you can create a pretty good looking letterhead in about an hour or less once you get the hang of using the program. The next step is to convert the letterhead to a format that can be interfaced with *Telewriter-64*. You are instructed to load in from disk one utility program and *MERGE* it with another short program called *SUB/MRG* and *SAVE* the revision to the program disk. The next step is to add one BASIC program line to the *Telewriter-64* binary file program called *S/XXX* and save the modification to disk. Now, whenever you are working with *Telewriter-64* and wish to print out a letter with your custom letterhead you can easily do so by pressing 'L' from the binary disk file menu. Even with the text buffer packed

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to its limit the letterhead utility worked without a flaw and returns to *Telewriter-64* without disturbing the text buffer contents. Another series of options lets you do the same thing from within a BASIC program using a similar transfer process, but again you have to resave the utility in ASCII format so it can be merged.

Master Design is not limited to just letterhead design even though no other possible application for it is mentioned in the manual. Since you have full control over *PMODEs* and color sets (but not artifact graphics) you could also use it for designing Adventure game screens that can be displayed using BASIC by *LOADing* in the graphics file while in the appropriate graphics mode. The program also lends itself to CAD (computer aided design/drafting) in being able to quickly draw basic geometric shapes and label dimensions with the editor and graphics modes. It took me about 30 minutes to design and draw a plan for a new computer desk complete with dimensions, center lines, screwholes and notes.

Nothing is perfect and this program does have a few minor shortcomings. Since most of the programs are written in BASIC, response from the keyboard translated into graphics screen output can be slow. Cursor response in the graphics mode using *PMODE4* can be touchy with the cursor not always moving one pixel with each press of the arrow keys. A machine language subroutine for all keyboard input would improve the response a lot.

Another shortcoming is found in the editor mode when you are entering lines of text. It's easy to flush lines left, but to center or flush lines right with each other you will have to do quite a bit of trial and error to get it right. The inclusion of a command such as "center line" or "flush right" or to be able to enter and delete spaces on a line like a text processor would make life much easier. *Master Design* could use a few more idiot traps to avoid having the program break if you enter a wrong command or syntax, but even if you do make a mistake, nothing in graphics memory is lost; you just *RUN* it and your design will still be there.

Being familiar with your printer is essential in getting the most from this program. Normal, compressed and elongated printer modes allow you to get a wide variety of effects, contrasts and line widths. Using a regular width will print the screen with a horizontal width of 4½ inches while an elongated set stretches it out to 7 inches across.

Master Design does everything it claims to do and its usefulness in a variety of other applications makes it worth considering as an addition to your program library.

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Real Talker
A Pronounced Success

By Kenneth D. Peters

Every CoCo in the world can be a real talker with a voice that speaks clearly and very understandably, like mine. The only thing you need is a ROM pack with a Votrax SC01 synthesizer chip. My particular CoCo has the ROM pack from Colorware. They call it Real Talker.

I remember the day the synthesizer arrived. My kids were all present at the door when I accepted the one small box from the UPS driver. "That's it!" screamed my oldest child, "Where are the rest of the boxes?" My kids watch "Whiz Kids" on TV and apparently envisioned a talking computer as a *room-full* of equipment. Needless to say, my kids left me alone immediately when, upon opening the small box, there was only a smaller item, the ROM pack, and a cassette tape.

Moments later my CoCo suddenly said, "Hi there. My name is Ralph." That was the last I saw of my computer (though I heard him off and on for quite some time). All the kids scrambled to their feet, hands flying and fighting to type in words from their various vocabularies. Later that night, and from time to time over the next couple of weeks, I finally got to analyze my CoCo's new hardware speech. The rest of this article is what I discovered about Colorware's Real Talker.

How do you use CoCo's new hardware speech synthesizer? Very easy! Plug the standard ROM pack containing the synthesizer unit into the cartridge port, turn on the computer, and *CLOAD* and *RUN* the speech software supplied — 16K programs on one side and 32K programs on the other.

The first program loaded is a BASIC program which, when run, will load and execute a machine language program giving you a text-to-speech routine and a speech editor. Disk users have to create a Real Talker program disk before experiencing the new voice, but the couple of minutes to create it are well spent and give the disk user additional advantages, over tape users, to using the Real Talker. In addition, disk users don't have to use a multipack interface to use both the disk and the ROM pack at the same time. A Y adapter ($29.95) works fine; a multi-slot expander can be used if you have one. I will discuss use of the disk version later.

The easiest way to get to know Real Talker and its capabilities is to use the *Text-to-Speech* program. After loading and running the BASIC program mentioned earlier, a menu appears giving you three options: 1) *Text-to-Speech*, 2) *Phoneme Editor*, and 3) *Help*. Entering '1' puts you into the *Text-to-Speech* mode. This is an automatic text-to-speech conversion program. After you are in this mode you are prompted to enter some words, phrases or sentences.

Pressing ENTER the first time is very impressive; actually, pretty neat! I would guess that when using this mode the Real Talker pronounces any words you type in with [illegible] than 90 percent accuracy. I was quite satisfied and impr[illegible] with its accuracy and clear pronunciation of most word[illegible] course, some words in the English language are pronounced according to their use in the sentence (e.g. lead and wind). In these cases and where words don't follow pronunciation rules, you have to deliberately misspell the word or use the phoneme editor (speech editor) to correct the pronunciation. The ability of the program to convert text-to-speech is based on a long set of pronunciation rules and exceptions, or algorithm table. The program takes almost 6K of memory the way it is and a 64K computer probably would have a hard time handling all the exceptions in the English language!

In the *Text-to-Speech* program, your text remains in a buffer and you can hear your text spoken again by simply pressing ENTER again. You may also add to or delete from the text by using the arrow or SHIFT arrow keys. The maximum length of a phrase or sentence you can type in this mode is 128 characters; however, under program control, your CoCo could speak as much text as your memory or tape or disk can hold!

I was amazed at some of the things the machine language *Text-to-Speech* is capable of. For example, it understands, and pronounces correctly, numbers up to 15 digits left of the decimal point, or 999 trillion, 999 billion, . . . and any number of digits to the right of the decimal point. Typing in the number 512,433.8457 is spoken as "five hundred twelve thousand, four hundred thirty-three point eight four five seven." In addition to understanding numbers, Real Talker — with the ML software — handles letters of the alphabet and arithmetic operators: e.g. $^{4\times3}/_2 + 10 - 1 = 15$ is spoken as "four times three divided by two plus ten minus one equals fifteen."

The period is only pronounced "point" when used with decimal fractions of numbers. Otherwise, the period is understood when used for abbreviations such as Mr. and Mrs. and is silently skipped over. Spaces cause a pause in speech. So putting in many spaces will give a long pause.

The capabilities of Real Talker and ML software converting text to speech are considerable and exciting! My primary interest in the speech synthesizer is for use in educational programs for my children and speech therapy/exercises for my younger daughter. But other uses are limited only by the imagination. I can imagine Hi-Res graphic Adventures talking to you as well as arcade and other games. Together with the speech editor, foreign languages may be programmed and learned using the correct pronunciation. Imagine what a computer and hardware speech synthesizer could mean to people that cannot talk! They could now talk over the phone simply by typing what they want to say.

After "mastering" *Text-to-Speech*, I decided to go on to the *Phoneme Editor* by entering '2' in response to the initial menu. You can also toggle back and forth between the *Speech Editor* and *Text-to-Speech* by simply hitting the CLEAR key.

All of the speech heard when using *Text-to-Speech* is converted to phonemes automatically. Using the *Phoneme Editor*, you can modify the speech, or customize it, at a very basic level. There are 64 possible phonemes with four pitch levels giving a total combination of 256. The phonemes are the "building blocks" of sound as we hear it. The *Phoneme Editor* has its own set of one-letter commands which allow manipulation of phonemes, including commands for moving the cursor around a full screen of phonemes, changing, deleting, or inserting any phoneme within the current sequence, changing the pitch (emphasis or de-emphasis to words), saving and loading phonemes to or from tape or disk, and printing the phoneme list and the decimal values representing the phonemes to a printer. The pitch inflection can give added realism to your speech; for example, giving the intonation quality of a question being asked.

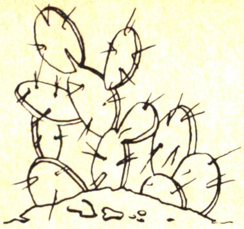
One of the advantages of using the *Phoneme Editor*, besides modifying speech generated by *Text-to-Speech* and creating speech from scratch, is the generation of decimal codes for each phoneme. These decimal codes can be used to duplicate speech directly using Real Talker without the *Text-to-Speech* ML program. First type the text you want to say, using *Text-to-Speech*. After pressing ENTER to hear your text, toggle to the *Phoneme Editor*. This gives you the phoneme sequences that make up the text you entered and gives you a chance to modify the speech if desired. Saving the phonemes to the printer at this point using the phoneme command 'T' will print the original English text then print a list of the corresponding decimal values representing each phoneme used in the editor buffer to create that text speech. The advantage of the decimal codes comes from not having to load or use the *Text-to-Speech* program to make Real Talker speak once you've obtained the equivalent sequence of decimal values. Simply having the ROM pack in the cartridge port and *POKEing* the decimal values into location 65440, in sequence, will duplicate the speech exactly as it was generated originally in the ML software (assuming you also turn on the audio pathway to the TV speaker by the use of three pokes). This might be quite useful for programs using the same speech each time you use the program, and therefore you would not need to load or wait for the ML to load.

Now that you know about the Real Talker and its software, how do you *really* use it? I mean, if you're like me, you want to be able to use a voice synthesizer for practical purposes like using it with your own educational, utility, or game programs.

If you want to use *Text-to-Speech* (referred to as ML) with your BASIC program, you must load the ML in one of two ways: *CLOAD* and *RUN* the BASIC program supplied with Real Talker, which loads and executes the ML. Then BREAK and return to BASIC where you *CLOAD* your program, leaving the ML intact. Then all you have to do in your program is use *X = USR (A$)* wherever you want the text spoken that is in string A$. Or *CLOAD* the ML directly from your program. A simple program might look something like this for a 32K system:

```
10 CLEAR 2000,26879          (Reserve upper RAM
                              for the ML)
20 CLOADM "VOTOLD32"         (Load the ML, assum-
                              ing it is stored after your
                              program)
30 DEFUSR = 26880            (Tell BASIC where ML
                              entry point is)
40 A$ = "THIS IS AN EXAM-
PLE OF YOUR REAL TALK-
ER VOICE"
50 X = USR (A$)              (Execute ML and say
                              the text)
60 INPUT "ENTER ANY-
THING YOU WOULD LIKE
ME TO SAY";A$
70 GOTO 50                   (Insert text and execute
                              speech routine)
```

That's it! Now you can create any BASIC program with speech. You are free to use any valid string instead of A$ and you can input the string any way you ordinarily would, through *DATA* statements, *ARRAYS*, or prompting through the keyboard. It took me only a few minutes to modify a



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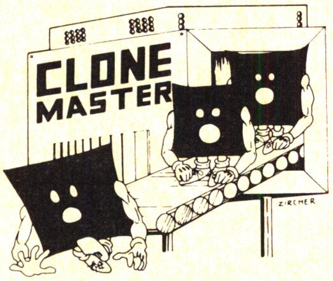

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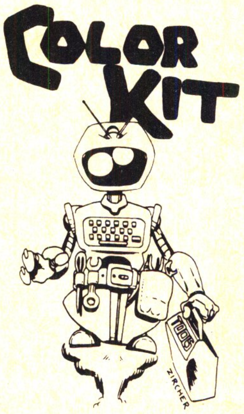

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spelling program I had written for my children to use Real Talker.

Up to now all commands and Real Talker functions have been the same whether using the cassette or disk version. Disk users will find an additional advantage in creating talking BASIC programs that is not available for tape systems. After creating a Real Talker program disk, taking only a couple minutes to *CLOAD(M)* and *SAVE(M)* two programs, disk users can create, with the greatest of ease, stand alone BASIC subroutines that speak.

How do you make these subroutines? Type in your text you want to speak using the *Text-to-Speech* program. Then press CLEAR which transfers you to the editor. Modify your speech if desired (usually not necessary) then press 'S' to save. Answer the prompt with 'D' for disk save and enter a filename and a line number to store the subroutine. That's it! Saving to disk not only saves the phonemes, but actually creates a talking subroutine with an assigned line number. Fast and simple. In a matter of minutes you can create dozens of talking subroutines. Then, using the disk BASIC *MERGE* command, you can incorporate any combination of the newly created speech from your "library" of talking subroutines into a new or pre-existing program just as fast. Once the talking subroutines are created you no longer need the software utility programs (*Text-to-Speech* and *Phoneme Editor*) to use Real Talker. Simply plug in the voice ROM pack and *CLOAD* or *LOAD* your BASIC program containing the talking subroutines, and call the subroutines as you would any other subroutines using the *GOSUB* statement.

I had the opportunity to use the Real Talker with both cassette- and disk-based 32K systems and I was impressed above expectations with both. The quality of the voice spoken was quite clear and understandable and *Text-to-Speech* seemed to pronounce most words with surprising accuracy, especially considering the English language with its ambiguities and exceptions to the rules.

The only thing I found lacking in the whole package was a *clear* description of how to use the ML *Text-to-Speech* program with your BASIC program. All the information was given, either in the manual or the BASIC program that came with the Real Talker. And there was even a section in the documentation on the ML program and a short paragraph describing "in order to use the ML." However, everything was not totally clear. I think some beginners and medium experience users probably would not be able to jump in and have their program talk on the first try. I'm not a beginner and I'm not an advanced programmer. I've never used the *USR* routines in writing my own programs and I believe not being familiar with *USR* programming is where some of the initial confusion came in while putting together my program with Real Talker. I think it would be good for the manual to actually spell out an example. I was able to piece things together by looking at the documentation and the BASIC program Colorware had written to load and execute the ML. I've talked with Colorware about the problem and was assured that a *clearer* documentation is in the making. By the time this review goes to press it should be inserted into the manual. With that addition to the documentation I don't think *anyone* would have any problem using this voice synthesizer. In the meantime, you should find my example helpful. If you need help or further information I think you will find a phone call or letter promptly answered. My experience with Colorware has been very satisfactory. They *do* seem to support their products, as their ads say. I appreciate being able to talk to someone over the phone, whether just looking for information or needing technical help.

Real Talker is compatible with any 16, 32, or 64K Extended or non-Extended CoCo, disk or cassette, or TDP System 100. It is also available for the CoCo 2, which requires a power supply modification for the Real Talker. Therefore, CoCo 2 users will need the Real Talker 2 version which costs $10 more, but well worth the price.

Voice synthesizers have become much more affordable in recent months. I think you'll find Real Talker will literally be a "real talker" and you will be impressed and satisfied with the results. When combined with the *Text-to-Speech* package, Real Talker is a very capable, flexible, and easy to use speech synthesizer system at a reasonably affordable price. I may sound positive about Real Talker, but you don't have to take my word for it. Real Talker comes with a 30-day return policy if not satisfied, for *any* reason.

(Colorware Inc., 78-03 Jamaica Avenue, Woodhaven, NY 11421, $59 ROM pack and tape, $69 for CoCo 2 version)

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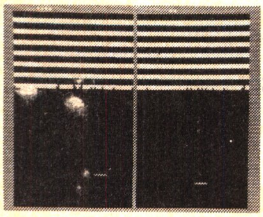

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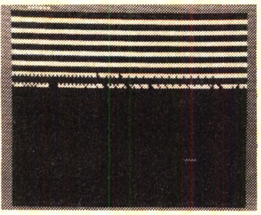

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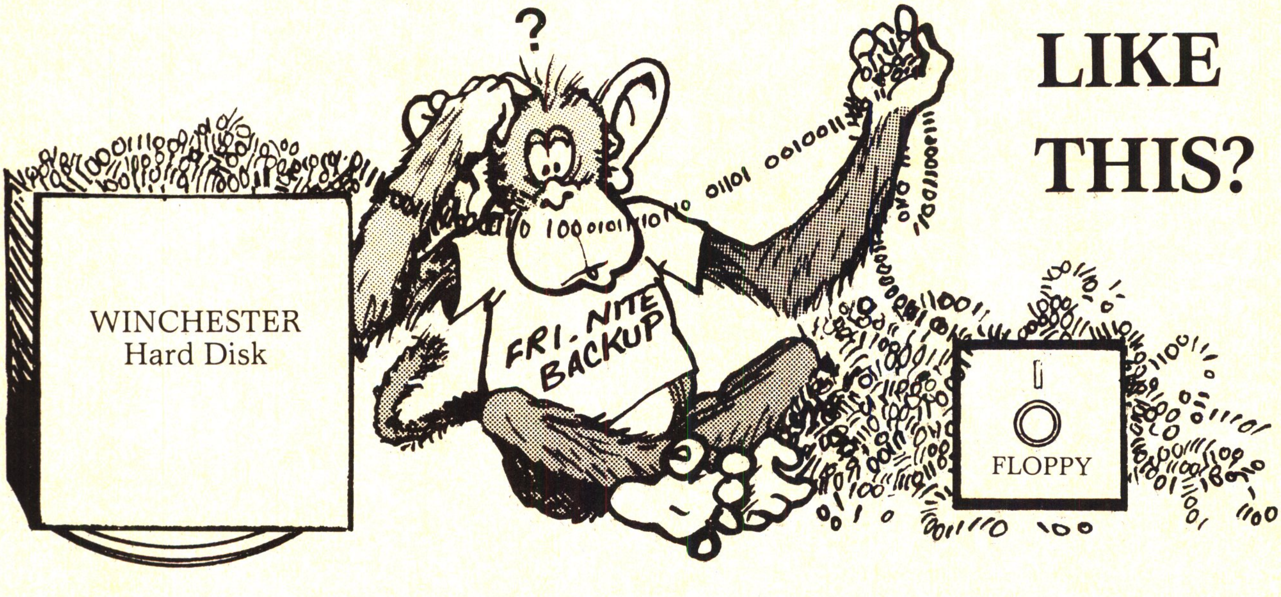

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E.T.T. Makes Learning To Type Fun

If you're among the growing throng of people who are taking twice as long to learn how to use your Color Computer because you never learned to type, you should be about ready for E.T.T., the electronic typing teacher.

After all, typing with eight fingers ought to be about eight times as fast as the one-finger, hunt-and-peck approach, right? All of us know at least one person, however, who seems to have done okay using the index finger and wouldn't change. But did you ever wonder how long it took that person to reach that point? He probably still looks at the keys, doesn't he?

Would you believe that after about 10 hours of proper instruction, you can become a touch typist? All it takes is concentration, and practice, practice, practice . . . and a good program like E.T.T.

Developed by CoCo Warehouse in Westland, Mich., E.T.T. reflects a lot of hard work and loving care, plus much attention to the basics and careful planning to make the process of learning to type much easier for you.

The program comes with a 12-page instructional booklet that takes you step-by-step through the process, starting with such necessities as preparing your work area and assuming the correct posture. The creators also have added the extras that make this a fun experience, accompanied by some nice graphic elements.

The first thing you need to know is the location of the "home" keys. Your left four fingers (no thumbs, please) rest on the A-S-D-F keys and your right four fingers are on the J-K-L-; keys. These keys are always highlighted on the screen, so you shouldn't have any trouble remembering them.

E.T.T.'s finger exercises take you through every key using finger-letter combinations. Throughout the process, you are expected to keep your eyes on the screen — instead of the keyboard.

The program comes with 19 different lessons, believe it or not, adding up to an incredible value for only $19.95 since it also includes hundreds of practice sentences.

Lessons one through nine are essentially basic instructional programs. Variety is heightened with Lesson 10 as you get into such literary compositions as "Jack's Journals," "My Shadow," "Happy Homonyms," "Ben Franklin," and "Father William."

The documentation notes that over 50 percent of all typing consists of 50 common words, noting that you can breeze through more than half of any typing chore by mastering these words. Lessons 7, 8 and 9 contain practice sessions on common words.

There also are tips to improve speed and accuracy, as well as an option that allows you to remove the highlighting of the home keys.

Actually, you may or may not have an advantage using a monitor, because in typewriter classes students are taught without having any reminder in front of them, except for a teacher who is keeping her eyes open for "cheaters." In other words, they are not allowed to look at the keys. The jury is still out on whether the use of a monitor results in a better typist.

There's also an E.T.T. Talk feature. Every time you *RUN* the program, there is a delay at the beginning because the computer is busy creating 30 fresh sentences. The computer can create 1,000 such sentences, giving you a different set every time.

You also may create your own exercises, with up to 30 sentences, and save them on tape for use later on self-tests. Results are given after every test. Any error, no matter how small, will cause E.T.T. to score that exercise not right. Poor old E.T.T. can only count "exactly rights" so be sure to do your spacing correctly, too.

You will be given your words-per-minute count, too. Words are considered five characters long. In this mode, E.T.T. does not deduct for mistakes, which most formal systems do.

It's fairly obvious to someone with a couple of decades of typing experience that a professional instructor was instrumental in setting up this sophisticated program. It is a serious program for the person who wants to learn to type. It is not a game, by any means, but it does make learning fun.

(CoCo Warehouse, 500 North Dobson, Westland, MI, $19.95 tape only)

— Charles Springer

Hint . . .

A Timely Fix

I see again that someone is having a problem with the untimed stop bit using *Color Disk Scriptsit*. The following is a patch that will take care of the problem and also one that will allow you to use 4800 or 9600 Baud.

Load DOS (don't run) and list line 101-102. This will give you the Rev. Number and date. Mine was 1.2 and 12/07/81.

Insert line 15 to fix the untimed stop bit problem and lines 16 and 17 for the printer Baud rate fix.

```
15 POKE 3772,&HBD:POKE3773,6:POK
E 3774,&H12  'FIX FOR UNTIMED ST
OP BIT PROBLEM
16 'BAUD RATE PATCH OVER RIDES T
HE BAUD RATE SET BY THE PROGRAM.
17 POKE 3783,&H8E:POKE 3784,0:PO
KE 3785,7  'CHANGE THE POKE TO 3
785 TO A 7 FOR 9600 BAUD OR 18 F
OR 4800 BAUD
```

Line 15 forces the DOS print routine to jump to the same bit timing routine for the stop bit as it does for the other bits. Line 17 changes a Ldx from H623 (where the program gets it's delay value instead of 150) to a Ldx with a constant value (either 7 or 18).

Resave the DOS program and the patches will be applied every time the program is run. If someone has a different version of DOS (if there was one), I would be happy to lend them a hand patching their version.

Jim Kushman
Norwood, OH

Blue Streak Printer Interface Gives More Freedom Of Choice

When the Color Computer was introduced, Radio Shack broke with its own tradition by using an RS-232 serial port for the printer instead of the Centronics-type parallel port that their other computers used. This saved quite a bit of money by using one port for both the printer and a modem, but it also meant that the existing Radio Shack printers (except for the Quick Printer II) didn't work on the CoCo. Starting with the Line Printer VII, Radio Shack put a serial interface on those printers that were expected to appeal to home users, but they normally worked only at 600 and 1200 Baud (the CGP-220 ink-jet printer will run at 2400), and the CoCo still was unable to drive the many non-Tandy parallel printers on the market like Epson, Gemini, Okidata and others. A serial/parallel interface such as the Blue Streak solves this problem very nicely by converting the CoCo's serial data signal to parallel form; it is, in effect, simply a printer cable that connects the CoCo to a parallel printer.

The Blue Streak is a blue box with a switch and two cables; one plugs into the CoCo and the other plugs into the printer. It should work with any printer that has a Centronics-type interface (the Centronics 730, 737 and 739 and Radio Shack's Line Printer II and IV won't work because they take an edge connector instead of the 36-pin Amphenol connector used by other printers). The interface is normally powered by the printer; the Centronics standard calls for a +5-volt power source on the connector, and most printers have this. A notable exception is Epson, which doesn't have a +5V source on any of its printers; I'm told it can be modified, but this sort of thing sounds to me like the muffler commercial where the mechanic tells the customer, "I'll make it fit!" If your printer doesn't provide power, you can add an AC adapter to run the Blue Streak; Dayton Associates specifies the Radio Shack 273-1431A, which they will sell you for $4.95 plus shipping (in case you can't find one at Radio Shack). One note is that the manual for Panasonic's KX-P1090 printer says that +5V is available, but that it should not be used to power any external devices. The Blue Streak uses four integrated circuits; three are CMOS devices (which draw very little current) and the fourth is a low-power TTL chip, so the load should be negligible.

The Blue Streak is ready to go right out of the box in most cases. If you need to use an AC adapter, you have to remove a jumper plug inside the unit; if your CoCo has the 1.0 Color BASIC ROM (if you have Extended BASIC, type *EXEC 41175* ENTER to find out), you will have to change another jumper. The instructions cover this in detail, and no additional parts are needed.

The interface works quite well indeed. I have tried it on a Gemini-10X and a Radio Shack Line Printer VII, and it runs fine at speeds up to 9600 Baud (the upper limit). The only reason I can see to run at a speed less than 9600 is if your program locks in a Baud rate of 600 (or whatever) and doesn't permit changing it. A 9600 Baud rate (960 characters per second) is almost as fast as most parallel printers can handle, so the use of serial output instead of a true parallel port doesn't slow things down appreciably. You may now be asking why you need such a high Baud rate when your printer only runs at 80 or 120 characters per second or whatever. The thing that most people forget is that nearly all dot-matrix printers receive a whole line of characters and store it in a buffer before printing the line. If you are running a 120 cps printer at 600 Baud, a full 80-character line will take one and one-third seconds to fill the line buffer and half a second to print; at 9600 Baud, the line will take .08 seconds to transmit and half a second to print. This translates to an increase in "throughput" of over 200 percent!

If you are eyeing a parallel printer and want a neat and easy way to make it work on the CoCo, the Blue Streak is a good bet.

(Dayton Associates, 7201 Claircrest, Building C, Dayton, OH 45424, $54.95 plus $2 S/H)

— Ed Ellers

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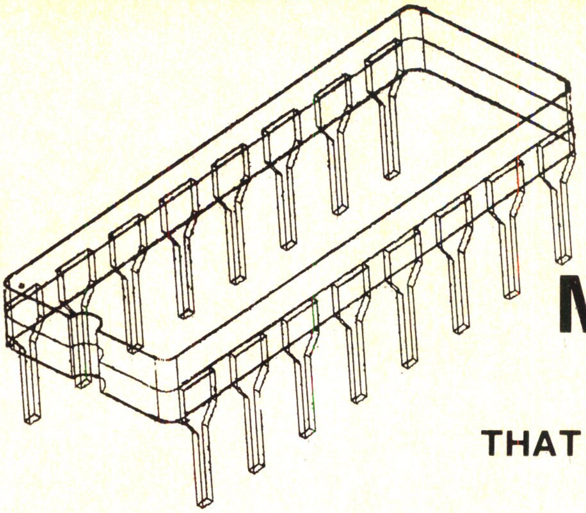

THAT LOST 32K

It is surprising how soon the error message "0M" appears when I write a program which handles a significant amount of data. The use of PCLEAR1 only temporarily clears the problem and I have to break up the program or store the data in direct access files on the disk. I like to keep the data in RAM to speed up processing and minimize disk accesses. I find this frustrating as I know that with the 64K RAM there is a PHANTOM 32K which I cannot get at.

Programs such as FLEX and OS-9 use all of this RAM, but consume much of it for the operating system. For a while I used a simple machine language program to access this memory, but it tended to be too inconvenient. The solution was to design a program which integrates with COCO's BASIC. The result was the PHANTOM MEMORY program.

The PHANTOM MEMORY package adds a new type of array which is indicated by preceding the variable name with P and an exclamation (P!) symbol. There are 32767 memory bytes available for these arrays, enough for 32767 characters, 6460 numbers, or any combination thereof.

All of these PHANTOM array variables can be used in the same way as the regular array variables in a BASIC program, (program 1).

Notice the new command PDIM, and the new variable P!A(15). PDIM declares the array in the same way as the normal DIM statement. In program 1 it is used to define two arrays P!A(300), a 300 element numerical array, and P!B$, a 40 element string array with strings of maximum length 16 characters. These PHANTOM variables are then used in the following statements exactly as though they were normal arrays.

The statement PDIM 0 in line 5 is used to reset the PHANTOM array. If this is not used at the beginning of a program all of the PHANTOM variables defined in the previous program become available to the next program. This adds the ability to chain programs, each program loading the next as in programs 2 & 3. Thus it is possible to have one program generate data which is then processed by a second etc.

The PHANTOM MEMORY program is written in machine language and costs little in speed. It can be added to your system simply by using the LOADM or CLOADM command at the start of each session or by using the command at the start of the program.

The PHANTOM MEMORY program is available on disk and tape for $29.95 and a cartridge version will be announced soon. It requires EXTENDED BASIC and, of course, 64K of RAM.

Order from: TRILLIUM SYSTEMS
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```
1 'PROGRAM #1
5 PDIM 0
10 PDIM A(30),B$(40,16)
20 P!A(15)=355/113
30 P!B$(10)="STRING"+STRING$(5,"
#")
40 X=14*P!A(15)+9.3
50 PRINT "A= ";X
60 PRINT "B$= ";P!B$(10)
```

```
10 'PROGRAM # 2
20 'PROGRAM TO GENERATE DATA
25 CLEAR 500
30 PDIM 0
40 PDIM DAT1(2500),SDAT$(120,150
)
50 FOR I=2000 TO 2400
60 P!DAT1(I)=SQR(I)
65 PRINT @455,I
70 NEXT I
80 FOR I=&H41 TO &H70
90 P!SDAT$(I)=STRING$(150,I)
100 NEXTI
110 RUN "PROG3"
```

```
10 'PROGRAM #3
20 'PROGRAM TO RETRIEVE DATA
25 PRINT"NOW IN PROGRAM # 3"
30 PRINT"ROOT 2200";P!DAT1(2200)
40 PRINT"STRING # &H66";P!SDAT$(
&H66)
```

Programmer's Sketch Pad
Easy Text Screen Coding

When I first began programming my CoCo, I found myself constantly referring to the *PRINT@* screen location layout in the back of the Radio Shack BASIC manual. Finally, in a burst of creativity, I created a reusable form by carefully removing the layout from the manual and covering it with a self-adhesive plastic sheet from my local office supply store. This worked fairly well although the plastic was not designed for heavy-duty use, and the layout itself still required counting from right to left to find the actual location. Well, I knew if I waited long enough someone would dream up a much more professional version of my do-it-yourself project.

Just recently released by Syntactics of Redcrest, Calif., is a programmer's aid package entitled the Programmer's Sketch Pad. The package consists of two high quality sketch pads covered in plastic, a felt marking pen and a very well-written "idea" booklet. Before going into more detail, I must mention that these pads (screen layouts, if you prefer) are designed for use with Color BASIC's *PRINT@*, *SET* and *RESET* commands. If you are looking for Extended BASIC high resolution graphics layouts I would suggest self-adhesive plastic and the layouts in your Extended BASIC manual.

First, let me cover the pads themselves. As I mentioned earlier, you receive two duplicate pads. Each pad is a two-sided 8½ x 11-inch sheet covered in heavy duty plastic. On the first side is a 32 x 16 *PRINT@* location layout with each and every location clearly marked. In addition, the various graphics characters are pictured with their corresponding *CHR$* values and specific information on how to create the characters in any of the eight possible colors. The second side contains a 64 x 32 layout representing the locations for the *SET* and *RESET* commands. Again, each location is clearly marked, although this time both the horizontal and vertical coordinates are provided for every location. This side also contains a sample of the *SET* command and a list of the numeric values associated with each of the eight possible colors. All in all, just about everything you need for coding on the text screen is provided. The only minor problem I can find is that the locations are indicated by very dark numbers and the grid itself is very lightly drawn. This makes it somewhat difficult to write on, and hard to read what you have written. The problem can be alleviated by using a bold point felt marker, but I would have preferred the contrasts to be reversed.

Also included in this package is a fine point marking pen (a bold point would have been better) and a 12-page "idea" booklet. I call it an idea booklet because it is oriented toward the beginning programmer and is filled with ideas and programming tips on using the Sketch Pads. This booklet takes up where the Radio Shack manuals leave off in discussing the *PRINT@* and *SET* commands. Part of the booklet is devoted to a sample budget and a sample graphics program. These programs are then dissected line by line and all the coding explained in detail. This booklet only serves to further enhance an otherwise very professionally prepared programmer's aid.

That's about it. The only thing left to mention is the price. I don't normally discuss prices in my reviews because I think all prices are really relative. This package sells for $12 and I know many people, including myself, who would hesitate to pay that much for two plastic-coated sheets, a marking pen and a short booklet. After seeing the product and realizing the time and effort it will save me, I definitely feel its worth to me equals or exceeds the price being asked. You, of course, will have to decide for yourself but I have easily paid three times as much for a fancy utility that I use about one-tenth as much as the Programmer's Sketch Pad.

(Syntactics, P.O. Box 257, Redcrest, CA 95569, $12 postage paid)

— Ken Boyle

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Here's The 'Beef' Where's The Pork, Lamb?

More Beef is a program with a functional approach to aid many farmers, feed lots, feed mills and other such persons with interest in the beef or farming industries. It will provide a cost per pound value based on analysis of available feed rations. The program is provided on tape complete with instructions for loading to disk. It does require 16K Extended BASIC and is advertised to work on the TDP-100 and the Dragon computers.

First of all, let's establish a scenario. A feed lot operation has 200 head of 375-pound steers with a limited amount of their usual feed source available. The operator of the feed lot, being the aggressive, up-to-date person that he is, has his very own CoCo for multiple uses around the business. *More Beef* is one of the "CoCo jewels" available to our man. Geographic location is no problem as both metric and standard American measures are supported, by different versions of the program, both on the same tape.

The dilemma our man has to confront is that he has planned poorly and somehow has allowed his supply of feed to be less than required to support the operation. His ability to support the herd to full market weight is greatly impaired unless he can make the right decision.

He ponders frantically at what can be done to save face before he loses money or, worse yet, his herd. Several thoughts cross his mind. "I can sell the herd at feeder prices, if I'm lucky I can at least break even, and start over again next year." He begins to see his world crumble, and another idea develops. "I should have bought more hay, but the price per bale was so high this year. That drought last summer is what really ruined me." His mind is in such a turmoil that he can't think straight. "I would find another source for feed but what should I purchase?"

Tah-Daa! *More Beef* to the rescue! He turns on his CoCo and loads the *More Beef* program. Knowing the size of his herd and their feeding requirements, he uses the program and soon determines not only the most fitting feed source, but additional supplemental requirements and cost per head (excluding supplements) as well. With a great sigh of relief he gently slumps down into his chair as he praises the development of such business aids as *More Beef.*

The scenario could have happened anywhere in the world. At least anywhere that cattle are fed and anywhere that the CoCo is available. (It would be tough to raise a herd in either of the pole regions and a few other out-of-the-way places.) The important thing is that *More Beef* is a quality piece of software that provides a maximum level of flexibility and with a medium amount of effort will provide the desired results.

The program can't do it all. Using *More Beef* does require some knowledge about the environment you're working in. You would be required to supply or verify the following:

What kinds of feed sources are available.
What the herd requirements are thought to be.
Units of measure (bales, pounds, grams, etc.).
Approximate cost per defined unit (should be really close if not exact).

More Beef allows the user to control and edit all the data contained within the file which you develop using the program. The documentation was plentiful and used frequently in the beginning. As I became more proficient at using the program, the documentation was still helpful as a reference. Using the program on a tape system can be cumbersome, as the file needs to be reloaded each time you desire to process a request for different functions. On a disk-based system this would not be noticeable at all.

All in all, I really struggled trying to find something about the program I didn't like. Having been a part-time vocational school instructor I'm convinced that if I look hard and long enough, I can find something that could be better. Well, I finally saw something that could cause confusion, but by no means disrupts the function of the program. On the menu screen, when choices for action are listed, the first line shows the function followed by the selection number. On the second line these are reversed, showing the selection number then the function supported. (Or was it the other way around?)

I have one question for the source of this program and I haven't asked them yet but maybe they'll see this review and get the hint: Where's the "More Pork," the "More Lamb," the "More Chicken," etc.?

(Moreton Bay Software, 316 Castillo St., Santa Barbara, CA 93101, $49.95, provided on tape with instructions for loading to disk)

— A.R. Compton

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Conversion Aids Helpful But An Ounce Short

As the amount of educational software for the CoCo continues to expand, more programs are being released which deal with more than the basic three R's.

Shamrock Software has released a series of programs designed to assist a student in reviewing his knowledge of converting one unit of weight and measure to other units.

These programs are not the standard educational program designed to be used by a student interacting with the computer. These programs, instead of reviewing and correcting on the screen, generate a printed worksheet for the teacher to use as a test paper or a review drill paper.

The four programs are titled: *Length, Area, Volume,* and *Capacity* (Liquid and Dry). Each is written in BASIC and is provided on cassette. They do not contain the elaborate bells and whistles (sound, color, and graphics) necessary with an on-screen program. The user is asked the date to be printed on the sheet, the number of drill questions desired, the number of different quiz sheets desired and then away it goes. While the program is running, no data appears on the screen. The quiz sheet is just printed by the printer.

The printed format of the quizzes is a blank line for the student's name printed first, followed by the date entered. A line is skipped and then the quiz questions are numbered and printed. A space is left for the answer followed by the answer being printed at the far right of the page.

An example of a quiz line is:

1. Change 323 feet to inches l .... 1. 3876 in.

Using this formatting, the answers can be cut off for use later as an answer key or just folded under to allow the student to check his own work.

If multiple quiz sheets are desired, the program assumes 66 lines per page, advances to the next page and prints the next sheet. Each worksheet is different.

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The measurement conversions tested by each program are:

Length:

Feet to Inches
Inches to Feet
Yards to Feet
Feet to Yards
Yards to Inches
Inches to Yards
Rods to Feet
Rods to Yards
Yards to Rods
Miles to Feet
Feet to Miles
Miles to Yards
Yards to Miles
Miles to Rods
Rods to Miles
Nautical Miles to Feet
Feet to Nautical Miles
Nautical Miles to Statute Miles
Fathoms to Feet
Feet to Fathoms
Perimeter of a Rectangle
Perimeter of a Square
Perimeter of a Triangle
Circumference of a Circle using Radius
Circumference of a Circle using Diameter

Area:

Square Feet to Square Inches
Square Inches to Square Feet
Square Yards to Square Feet
Square Feet to Square Yards
Square Rods to Square Yards
Square Yards to Square Rods
Square Rods to Acres
Acres to Square Rods
Square Yards to Acres
Acres to Square Feet

Volume:

Cubic Feet to Cubic Inches
Cubic Inches to Cubic Feet
Cubic Feet to Cubic Yards
Cubic Yards to Cubic Inches
Cubic Inches to Cubic Yards
Volume of a Rectangular Solid
Volume of a Cube
Volume of a Right Circular Cylinder using Radius
Volume of a Right Circular Cylinder using Diameter
Volume of a Cone using Radius
Volume of a Cone using Diameter
Volume of a Sphere using Diameter
Volume of a Pyramid

Capacity — Liquid:

Ounces to Cups
Cups to Ounces
Cups to Pints
Pints to Cups
Ounces to Pints

Pints to Quarts
Pints to Gallons
Quarts to Gallons
Quarts to Pints
Gallons to Pints
Gallons to Quarts

Capacity — Dry:

Quarts to Pints
Pints to Quarts
Pecks to Quarts
Quarts to Pecks
Bushels to Pecks
Pecks to Bushels
Barrels to Quarts
Quarts to Barrels

Capacity (Liquid and Dry) are two separate programs sold as one on opposite sides of the cassette.

The user is given the opportunity to choose any or all of the conversions contained in the program. Instructions are included in the documentation on how to choose or delete the various measurements. This is done by modifying lines in the BASIC statements rather than choosing from a screen menu.

This works out well if the user has mastered the basics of programming in BASIC, however a screen menu would be more desirable.

Diverting from the review for a minute: A word of praise to Tandy for its continuing program of offering free classes to teachers at their computer centers. The ability to program and edit is most valuable in circumstances such as this one where some knowledge of programming is required.

No printer specifications are given. The programs worked well on my DMP 100 without modification. As it is written, any 600 Baud, 80-column printer should be able to handle the printing of the worksheets.

Did I love the programs "a bushel and a peck"? Nope, about an ounce short. In my opinion, the programs have one major shortcoming. They don't allow the user the option to input his own quiz values. The measurements to be converted are only randomly generated. This results in some wild numbers and changes in levels of difficulty between quiz sheets generated by the same program.

Another enhancement I would like to see added to the program is the option to print the conversion formulas at the bottom of the worksheet similar to the way answers are printed at the right of the worksheet. They could be removed or folded at the teacher's option.

In summary, these programs offer the ability to easily print measurement conversion work or quiz sheets. If you have a need for them, the prices are reasonable and the features which are lacking can be easily added if the user is capable of doing some basic programming.

Shamrock also offers similar programs for whole numbers, fractions, decimals, percentages, weight, time and speed.

(Shamrock Software, 4382 Norton Road, Radnor, OH 43066, $9.95 each,)

— Bruce Rothermel

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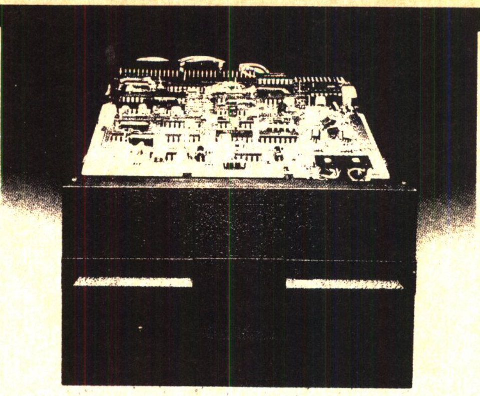

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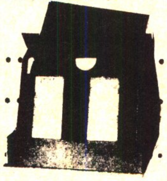

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Remote Terminal Driver
A Good BBS Adjunct

Remote Terminal Driver (RTD) Version 3.0 is one of several remote terminal programs available for the TRS-80 Color Computer (CoCo). It was written in position-independent machine code by Ed March Jr. and marketed by Silicon Rainbow Products.

RTD is supplied on disk with a 5½ by 8½-inch manual. A minimum of 16K RAM is assumed. A *CLEAR* command should be entered in the direct command mode *(CLEAR XXX,&H39FE)* prior to loading *RTD*. This is to protect *RTD* from BASIC and to move the system stack. *RTD* loads from $3A00 through $3F52 (14848-16210). You may offset load *RTD* in a 32K memory CoCo by first entering the appropriate *CLEAR* command preceding your offset load. The *CLEAR* command must precede the loading of *RTD* or the loading will overwrite the system stack, causing the computer to lock up!

The program is well-written and seems to be bug free. *RTD* has a lot of nice features that other remote terminal programs do not offer.

Carrier Detect (CD)
BREAK Key Detection
BREAK Key Disable
User Time Out
Control Character Detection
Password Protection
Lowercase Conversion

The manual has one page of instructions, which is not adequate for even the average user! There is even one glaring mistake: It says that you can load the program, then perform the *CLEAR* command, but the *CLEAR* command *must* be performed first, then load *RTD*. Six more pages of partial source listing provide the bulk of the information contained in the manual. This information is about the program usage area. The information provided here does not give a step-by-step guide to interface *RTD* with your programs or application. You are left up to your own wit and resources to figure out the proper, best, and most effective way to interface *RTD* with whatever program or purpose you intend to use it for.

The novice user will find *RTD* is not a "load and go" type of program. A more advanced user and/or programmer will probably find the features of *RTD* very nice once he or she has taken the necessary time to become intimately familiar with the program and its operation. With the lack of detailed instructions this type of familiarization will be required to obtain optimum results in utilizing all or even some of the unique features of *RTD*.

To use *RTD* as a terminal driver, a modem will provide the CD signal required, or the terminal being used will provide the CD signal direct. If the terminal being used is not capable of providing the CD signal, then the program must be modified so as not to look for the CD signal, or the CD line of the RS-232 port must be pulled TRUE after *RTD* is installed and operating.

Using *RTD* as a bulletin board system driver (BBS) will require an auto answer modem which should supply the CD signal and a BBS program. The BBS program in the November issue of THE RAINBOW magazine should work, but it must be modified to use the buffer area provided by *RTD*. A BBS program already tailored to run with *RTD* is available from Silicon Rainbow Products. Use of the buffer area in *RTD* should be done very carefully to obtain best results. When done properly, this is where *RTD* really shines! *RTD* overcomes most of the limitations in CoCo's BASIC, providing a well-rounded system, with the BREAK key disabled, lowercase conversion and password protection to protect the BBS system and allow only proper access to the system operations.

Overall, *RTD* is a good program. If you are thinking of getting a remote terminal program for a bulletin board, *RTD* should be considered as one of the leaders. The lack of instructions can be overcome with careful study of the program, or by purchasing the entire BBS package. If what you need is just a driver for a local terminal, then probably your needs can best be filled by one of the terminal drivers published in the CoCo magazines.

(Silicon Rainbow Products, 1111 W. El Camino Real, Suite 109, Sunnyvale, CA 94807, $30 tape/disk)

— Douglas Cook

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The CoCo Word Processing 'Dynamic Duo'

By Dan Downard

Most of you remember the Dynamic Duo, Batman and Robin. Whadda ya mean? Never heard of them? Well, I guess at 40 I'm not only an old timer at computers, but TV as well. We had better forget about the Dynamic Duo for now, or maybe give the name a new significance. *DynaStar/ DynaForm* and *DynaSpell*, in my opinion, rightfully deserve the name "The Dynamic Duo" of word processing software for the CoCo.

DynaStar has been around since 1982 for OS-9 systems, an old timer by computer standards. Frank Hogg Labs recently re-released this program for use with their *O-Pak* screen package for use on the CoCo. At the same time *DynaSpell* was rewritten for the CoCo and is advertised as a separate, but integrated, package.

Let's get our terminology straight. *DynaStar* is the actual word processing program. *DynaForm* is a companion program that actually formats the text file for printing purposes. *DynaForm* interprets the commands that were input using the *DynaStar* screen editor. For this reason, we will refer to both programs as *DynaStar*.

DynaSpell is a spelling checker that is sold as a separate package. It is a *natural* companion for a word processor, but can be used for any type of text files.

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- **Reviewed in Oct. '83 *Color Computer***
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This package requires a 64K CoCo, OS-9, one but preferably two disk drives, and a CoCo compatible printer. I guess you could consider the printer optional, but what good is a word processor without a printer? A special version of *O-Pak* is used for this program. Two of the graphic characters are redefined for use as text and cursor markers. The new version of *O-Pak* is on the disk. *DynaStar* automatically adjusts to the character set in use, whether it be 51 X 24 or 64 X 19.

DynaStar

What makes *DynaStar* so different? I like it for two reasons. First, the cursor controls. Figure 1 shows the most commonly used cursor control keys. As you can see they are arranged in a symmetrical pattern known as a "Control Diamond." CLEAR is the control key as in all other OS-9 software. For example, if you wish to move the cursor one word to the right, you would type CLEAR F. After about 15 minutes of use, these commands become second nature.

The second outstanding feature is the help screen, or screens. At the user's option, the top seven lines of a normal screen display the status of certain functions and a menu of the most commonly used cursor, scroll and delete commands. In addition to the help menu, a ruler line separates the menu from the text, providing you with a constant reminder of the location of your margins and tabs. More on that later.

The Files Menu And MACROS

There are six different menus to guide you through your task. The first menu is called the files menu. It appears as soon as you run the program. The main purpose of this menu is file management. In addition to naming the file, or opening an old file for editing, you have the option of executing SHELL commands, changing the working directory, or displaying a directory.

An important feature of this menu is MACROS. By pressing the escape key CLEAR BREAK and a control character you can define any number of commonly used phrases invokable by a two-stroke command. Up to 400 characters can be stored as MACROS. This feature is especially nice for program generation or editing. Remember, in OS-9, *BASIC09*, *C*, etc. *DynaStar* can, and should, be used to input your programs. ALL MACROS can be displayed from the files menu by use of the L command. One more comment about the files menu. After you become proficient at the different commands you can turn off the help menu if you wish. I haven't reached that point yet!

Other Menus

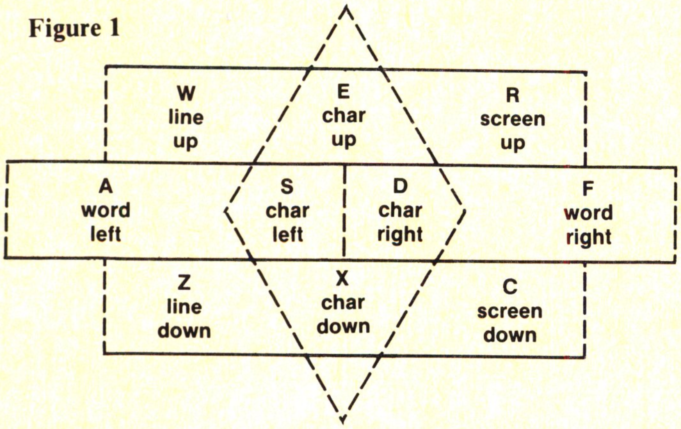
In addition to the main menu that is displayed during all editing, there are four supplementary menus for different types of commands. In addition to more cursor commands the 'Q' menu contains the necessary help for global string searches with replacement if desired.

Screen Width And Windows

The 'K' menu toggles the status of different features such as wordwrap, or whether you want the insert or overtype mode. In addition, this is the menu for setting tabs and the right margin. The margin, or display width, can be set at any value up to 255 characters. If you are using a width greater than 64, a moving window concept is used to horizontally scroll the display eight characters at a time. Keep in mind that the ruler line between the text and the menu always shows you where you are in relation to the left margin. It works flawlessly and is far superior to another word processor I have used with the same scheme.

Another welcome relief of this feature is the ability to justify text on the screen. No longer do you have to print out the text to see what it's going to look like. Tabs can be set, cleared or purged at any location between margins. No mention is made of the maximum number of tabs, so I assume 255 are possible. The tab settings cannot be saved. This would be a nice feature.

Figure 1



Block Commands

The 'B' menu is called for any block commands. Block makers identify the beginning and end of the text in question. After marking the block you can copy it, move it, kill it, write it to a disk file, or insert a disk file into the block. That should cover anything you want to move, or add. Only one block can be moved at a time. A warning is given regarding editing while the block markers are set. If you try, an error message will be displayed.

Printer And Dot Commands

The 'P' menu is actually the only way of using the *DynaForm* print formatter mentioned earlier. There are three basic commands in this menu including boldface, doublestrike and underline. The fourth command is the most important. After entering the 'P' menu, typing a period will display yet another menu, the "DOT" commands. Dot commands actually format your document. By inserting these commands in your text you can add headers and footers, paginate (number pages), etc. I would venture to say that any formatting you desire is available with these commands. A summary of these commands is listed in Table 1.

Table 1
Summary of *DynaForm* Dot Commands

.BP n	Begin Page #n
.CP n	Conditional Page
.PN n	set Page Number
.PL n	set Page Length [66]
.IG	Ignore to next 'dot'
..	Comment line
.HE text	Header
.FO text	Footer
.MT n	Margin at Top [3]
.HM n	Header Margin [2]
.MB n	Margin at Bottom [8]
.FM n	Footer Margin [2]
.PO n	Page Offset [8]
.SS	set Single Space
.MS n	Multiple Space [2]
.SP n	blank Space n lines
.OP n	OverPrint next n lines
.FI pathlist	File Insert
.MA xx	start Macro xx
.ME	End Macro
.XX	do macro xx
.DM text	Display Message
.IFE yy	If Even page do .yy
.IFO yy	If Odd page do .yy
.DXt text	inDeX entry (t=tag)
.XAt n	print indeX Alpha for tag t
.XNt n	print indeX Numeric for tag t
.SV name,text	Set Variable <name> to 'text'
.PV name,message	Prompt for Variable <name>
.DF pathlist	open Data File for mail-merge
.RV name1,name2,...	Read Variables <name1>, <name2>, etc.

Without explaining each dot command, a few are very important, and probably the reason this program is exceptional. The .SV, .PV, .DF and .RV commands are all a part of a mail-merge system for generating form letters. Not only can you mass produce letters from an address file, but you can customize them by either defining part of the text as variable, or prompting the user for a custom response. Examples are given in the manual for a custom form letter, explaining the system in great detail. I think one other word processor for the CoCo offers this feature, but you must buy two programs before it will work.

DynaSpell

The natural companion to any word processor is a spelling checker. *DynaSpell,* written by Dale Puckett, is an excellent choice for this task. This review was written with *DynaStar* and checked with *DynaSpell.* The system requirements are the same for both programs, and to repeat our earlier evaluation, they form the Dynamic Duo.

After creating your document all you do is type "SPELL" and you're on your way. The first decision you are faced with is which mode of operation you desire. You can select normal, auto print, or auto spool. Normal refers to the interactive, or terminal mode. Auto print lists each word not found in the 22,000 word dictionary to the printer. Each suspect word is flagged with back arrows and line feeds for recognition. The auto spool mode sends the output to a disk file for later printing or examination.

I selected the normal mode. Almost immediately I was prompted for the file to check, or offered the option of changing directories. I typed REVIEW and that was it. Meticulously, a status line in the center of the screen started counting from zero to 22,000 in 100-character blocks. Each word of my text was either identified as common or unique. A three-dictionary concept is used. A 1000-word common dictionary is used to speed up the process. After your text is compared to the common words, the remaining unique words are compared to the master dictionary. An additional MYWORDS dictionary is created by the user and is used also. *DynaSpell* identified nearly 300 unique words in this review so the checking process took about 10 minutes. I consider that very acceptable since, if you notice, there are quite a few "buzz" words in this article.

After the spelling checker is finished you are presented with the following menu:

Table 2
***DynaSpell* Commands**

P = Print suspect words
R = Read a DynaStar file
U = Use additional dictionary
W = Write corrected file
A = pick Alternate directory
S = call OS-9's Shell
C = Check words individually
F = Formatted read of Stylo file
B = Build alternate dictionary
N = check spelling in New file
D = list current Directory
O = return to Operating System

I think this list is self-explanatory. After selecting your command you are asked if the output is to be routed to the printer or the terminal. I decided to check each suspect individually. One by one, the words appeared on the screen. I was prompted to (A)ccept, (L)ookup, (R)eplace, (S)ave, (U)ndecided, or (Q)uit. If you find a mistake you just type (R) and retype the word with its correct spelling. After going through the words you return to the previous menu and save the file. That's about it. One feature that could improve future releases is spelling out the editing commands instead of using one letter prompts. It would make it a little easier to remember.

Another nice feature of *DynaSpell* is the LOOKUP command. This is a new addition to the spelling checker, but can be used as an independent program. All you have to do is type LK and part of a word and it will print all of the similar words in the dictionary. Wild card characters are recognized by their absence. It is a unique feature of any spelling checker I have used.

Conclusion

The documentation for these programs is above average. *DynaStar* is so well prompted that you really don't need a manual. The only time I used the manual was for dot commands and the mail-merge features. *DynaSpell* is a little more complicated and I think the manual could be improved. All of the information is there, but an example would be helpful.

Okay, Robin get out the Bat-computer and write a letter to the Mayor of Gotham City!

(Frank Hogg Laboratory, The Regency Tower, Suite 215, 770 James Street, Syracuse, NY 13203. DynaStar, $49.95; DynaForm, $49.95; DynaStar/DynaForm package, $99.90; DynaSpell, $59.95)

Hints . . .

BASIC09 Problems?

If you are having trouble getting BASIC09 to work correctly, try the following on a two-drive system:

```
DEL DIR DEFS
COPY /D1/BASIC09 /D0/CMDS/BASIC09
```

Do this for all the programs you intend to use on your BASIC09 disk (replacing "BASIC09" with the name of the new file).

Memo Minder Is A Record-Maker

As a writer I have a ridiculous pile of notes in a waste basket that I jokingly call my file system. Someday, I continually tell myself, I am going to organize all those news clips, quotes, notes and numbers.

Because of a little program called *Memo Minder* by Merrick & Co., someday is at hand.

I call it a little program because it is simple, straightforward and totally without hype. *Memo Minder* keeps notes in an unstructured file of up to 160 characters per item. The whole file will hold 200 individual records or 8,000 characters.

Searching for a particular file is as easy as remembering how you write notes. One file that I constructed has a list of public meetings for the year so if I want to know what day in July the school board meets, I call "Search For A Record" from the main menu. The screen prompt requests Target 1 — I enter "School Board." The next prompt requests Target 2 — an ENTER here would give me every record with "School Board" but by entering "July" I get only the July School Board memo.

Another main menu option will scroll the entire file for you. There is no sort routine so the records will be displayed in the order that you entered them. That's a problem, but it is one that I am willing to live with. Another aspect of the scroll feature is that it gives you a choice of three speeds at which the pages will be displayed. Three is the slowest and about the only one I can use (perhaps because I write long notes). Speed 1 rather zooms through the file.

The documentation is minimal by developing standards, but it covers everything you need to know. I like user-friendly software and this one really qualifies — it almost works itself.

I sat down the other day and made a list of things I could organize with *Memo Minder* and decided that anything that has to be stored and retrieved is a candidate for a *Memo Minder* file — it is that versatile. But remember, it will not sort your data nor will it print anything — it is a *Memo Minder*, just what the name implies.

Merrick provides both a tape and disk version. The documentation tells you how to set it up, in under 10 minutes. You also must have at least 16K Extended Color BASIC. Since it is not copy protected, I plan to get inside mine and try to increase its storage capacity to fully use my 64K — that's one refinement I could use.

I also plan to set up a file consisting of a story, one line per record, and use the scroll function to teach my kids speed reading. The uses for *Memo Minder* are limited only by the depth of your imagination.

(Merrick & Co., P.O. Box 73, Conifer, CO 80433, $9.95)

— Glenn B. Knight

Shaft Is A Challenge To Your Reflexes

As Monty Python says, "and now for something completely different" . . . there is a game from Prickly-Pear Software called *Shaft*. It is like no other game on the market that I know of and presents a formidable challenge to your reflexes.

The two title screens on *Shaft* are beautiful graphics drawings. The first scrolls by with the words "Shaft" moving horizontally and changing colors. When you hit the joystick button the second screen appears showing drawings of two people and asks you on which level you would like to start; easy or hard. The choice is made simply by moving the joystick to the left or right and again pressing the button.

When you start you will find yourself at the bottom of an "elevator shaft" and you must make your way across and up to the top. The descending elevators (eight of them) randomly go up and down on the screen. They are represented only as hollow boxes. If you are going across and the elevator comes down on you while you are under it, you will lose that man. If you make it to the opposite horizontal end, the service elevator (as I call it) will come get you, and bring you up one vertical level where you must go back in the opposite direction.

This is the method of play in *Shaft*. There are no strategies to think out and no decisions to be made. The whole game is a question of timing. No bonus men are given out, either.

At the lowest level of play, it is quite difficult to get past more than three of the five vertical rows and I would think children would find it impossible to play. Also, at times, the random patterns in which the elevators move may impede your progress after the lift takes you up a level, making it impossible to continue without getting killed.

Although *Shaft* is written in machine language and will run on a 16K machine, I have come to expect better offerings these days. The graphics are not spectacular by any means (except the title screens which are very nice) and the game play leaves something to be desired. It is, however, unlike any other game on the market and should be credited for being an original work in its own right and not a copy of something else.

(Prickly-Pear Software, 9234 E. 24th St., Tucson, AZ 85710, $24.95 tape, $29.95 disk)

— Steve Schechter

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Software Review

Super Edit — A Step Up From Extended BASIC's Editor

For those of you without Extended BASIC, you're missing one of Extended's most powerful features — an editor. For those of you with Extended BASIC, you have a good editor, but some things could be better.

Super Edit from The Dataman offers a step up from Extended BASIC's editor and, most of all, offers non-Extended users an editor without the need of Extended BASIC.

Super Edit is a line-oriented editor for use in editing BASIC programs on the Color Computer. It is written in independent machine language code and instructions are given in the manual on how to load it into any system from 16K to 64K. The manual recommends that it be loaded into as high a memory location as possible in order to leave the maximum amount of room for your BASIC program. With 64K, of course, this program does not interfere at all!

Super Edit can be used to initially write a program or a current BASIC program can be loaded in, then *Super Edit* can be *EXECuted* and edit work on the program can begin. It is an easy chore to go back and forth from *Super Edit* to BASIC by simply "Quitting" *Super Edit*. When you are finished with any BASIC commands, simply type *EXEC* and you are back into *Super Edit*.

If you have ever used *EDTASM+* from Radio Shack, then using *Super Edit* will require almost no instruction since it is almost identical to *EDTASM+*'s editor. Most of the commands have been preserved from *EDTASM+*: 'P'rint (to screen), 'D'elete, 'F'ind, 'I'nsert, 'C'opy, 'M'ove, 'R'eplace, and 'Q'uit. The syntax for these commands is slightly different, so have a quick look at the manual.

One of the new commands introduced by *Super Edit* is 'J'oin. The Join command is used to join two lines into one and can be continued indefinitely, thereby creating lines longer than 250 characters. The program will prompt the user if joined lines will come out longer than 250 characters as a safety feature; once two lines are joined, they cannot be separated.

Among the features of the commands; 'I'nsert allows automatic line numbering while "inserting" text. A BASIC program can be typed in this way very easily. Upon each carriage return, a new line will appear on the screen waiting for more data to be typed. The starting line as well as the increment can be set up by the user. Lines can also be inserted between other lines, although there must be enough room for the line number to fit; i.e., you can't insert a line between Lines 0002 and 0003. 'P'rint displays a line or a range of lines on the screen. Paging through a program is also possible as the command defaults to 13 lines of text to print on the screen if no line number or range of line numbers is specified. The 'D'elete command allows a line number or a range of line numbers to be deleted. The 'F'ind command is used to search for sub-strings of up to 30 characters in length within lines of text, starting with the last line printed on the screen. It allows you to continue searching after one has been found. It will not, however, search past 250 characters in any one line of text. Therefore, if lines have been "joined" together, any characters after 250 will not be searched. The 'C'opy command copies a line or a range of lines to a new line number(s), leaving the original text intact. 'M'ove moves a line or lines to a new line number(s) deleting the original line numbers. 'R'eplace deletes lines first and then leaves you in the "insert" mode to allow you to type new information where the old was. (Delete and Insert would do the same thing.) 'Q'uit returns you to the BASIC operating system, leaving your program intact.

I've always liked the editor in *EDTASM+* and, since this one is almost identical, I give it full marks. There is only one type of editor which I feel more comfortable with and that's a screen-oriented editor. For those of you with *EDTASM+*, well, maybe the Join command will appeal to you. And don't forget, you can't do disk I/O with the cartridge *EDTASM+*, whereas *Super Edit* allows you to go back to whatever version of BASIC you have.

(The Dataman, 420 Ferguson Ave. N., Hamilton, Ont., Canada L8L 4Y9, $16.95 U.S., $19.95 Can.)

— Eldon Doucet

Program Quickie . . .

Finding Those Bad Sectors

By Paul Gani

I have seen dozens of programs to find bad sectors and then isolate them from BASIC. Yet, all use *DSKI$* and thus, you always get I/O Errors and have to manually continue the program to find other bad sectors. Below is a short program to find all bad sectors with no interruptions. Just enter it and type *RUN*. The program will look for bad sectors (if any) and if it finds one, the program will say so and then continue. Then you can use one of the dozens of programs already published to isolate that area.

The listing:

```
10 DEFUSR0=PEEK(&HC004)*256+PEEK
(&HC005)
20 FOR T=0 TO 34:FOR S=1 TO 18
30 POKE 234,2:' SET TO READ
40 POKE 235,0:' DRIVE NUMBER
50 POKE 236,T:' TRACK
60 POKE 237,S:' SECTOR
70 POKE 238,14:' DUMP TO THE
80 POKE 239,00:' GRAPHICS AREA
90 Y=USR0(0):P=PEEK(240)
100 IF P<>0 THEN PRINT "ERROR IN
 TRACK";T;"- SECTOR";S
110 NEXT S:NEXT T
```

A Potpourri Of Games For The MC-10

I was beginning to wonder if the MC-10 is called a "Micro" Color Computer because of its size or because of the limited amount of software available for it. Fortunately, this is a review about two software game packages, *Micro-Games* and *Micro-Checkers*, now available from Radio Shack. Hopefully much more is on the way.

Micro-Games is a potpourri of games for the MC-10. It includes familiar titles like *Pong* and *Breakout*. You will also recognize *Lander*, a lunar lander style game. Also included is *Eggs*, a cute, original, catch-the-falling-egg game; and *Horse*, a horse race-style game. All the games are written in BASIC and utilize the low resolution graphics capability of the MC-10. Movement, if required, is achieved from keyboard input since there is no joystick port on this little computer.

For the most part, these games are well-written and execute surprisingly fast for BASIC. For instance, in *Pong*, the ball moves swiftly enough to be a challenge. I have seen versions of *Pong* written for the Color Computer and the ball moves so slowly that you could fall asleep between volleys. Part of the explanation for the speed achieved is that Micro Color BASIC executes about 15 percent faster than CoCo BASIC. I'm sure that in addition some of the speed comes from good programming skills as well.

Unfortunately, while studying and playing the games included in *Micro-Games*, I discovered a few "Micro-Bugs" which detract from the playability of two of the games. In *Pong*, if one player holds down one of his movement keys, the other player can't move his paddle. In *Lander*, an occasional FC Error occurs because the "sound" command is being sent a value higher than 255. (By the way, if you have bought this game, this problem can be fixed by adding the following to Line 30, *: IF V (-500 THEN V = -500).*

Micro-Checkers, another program available from Radio Shack, is also written in BASIC and works with a 4K Micro Color Computer. It is you against the MC-10 in the traditional game of checkers and the computer is good at checkers. You move your pieces by inputting the coordinates of the current position and the coordinates of the destination. Unfortunately, since the board's coordinates are not labeled on the screen, you must refer to a diagram in the instruction manual. If you legally jump an opponent, the piece is automatically removed from the board. In addition, the computer keeps track of all legal moves and awards "kings" as required. It should be noted that the board is drawn in low resolution graphics. The colors used to display the pieces has created a potentially fatal flaw. On a black and white TV, the pieces for both sides look the same, you cannot tell your piece from the computer's. It's okay on a color TV, but if you are considering the program for exclusive use on a black and white set, forget it. Other than this problem, and the rather inconvenient entry required to move the pieces, *Micro-Checkers* appears to play correctly and reasonably quickly.

In summary, these two software game offerings will most likely appeal to the beginner looking for games to play on the MC-10. Keep in mind that these are relatively simple games, and as noted contain a few "bugs." These problems, except for the black and white display problem with *Micro-Checkers*, are relatively minor and might be tolerated by a "software-hungry" MC-10 owner. These games obviously do not match up to the sophisticated arcade style games available for big brother CoCo, but the price does not match up, either.

(Radio Shack stores nationwide, *Micro-Games* Cat. No. 26-3360, *Micro-Checkers* Cat. No. 26-3361, $9.95 each on tape)

— Tom Szlucha

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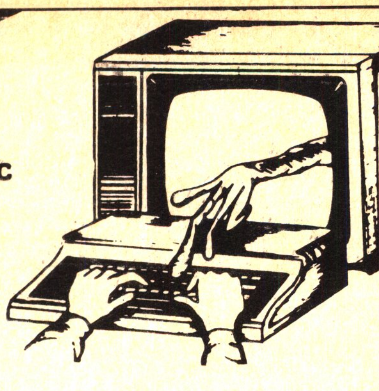

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Scatterbrain And *Better* — Two Good Games For The Price

Are you the type of person who loves to clean up the house, putting things in their proper places? That's the basis for *Scatterbrain*, a 32K ECB graphic text Adventure on tape. I had heard that graphics were starting to be used with tape-based Adventures and I was anxious to see how *Scatterbrain* stacked up. Unfortunately, I could not at first get the program to run properly. Investigating further, I discovered this program uses the famous speed-up *POKE* in Lines 1 and 150. I happen to own a CoCo that will not accept the speed-up and I think its rather rude of a company to sell such software without including the simple option of whether or not to use the speed-up *POKE*. After editing out the pokes, I proceeded to try out the game.

In *Scatterbrain*, you have been hired to put an 85-room mansion in order. There are 60 objects scattered through the house and you have to figure out where each one belongs. Some objects are fairly simple to place such as putting the Color Computer in the computer room. Other objects are a little more tricky. The objects are scattered randomly each time you start the game although the arrangement of rooms remains the same. This allows you to start with a new puzzle each time you run the game. However, since there is no provision for saving a game in progress, you must finish the game in one sitting. This is quite a task and could take hours if you don't already have the rooms mapped out.

The graphics were somewhat of a disappointment for a game that is advertised as a graphics Adventure. There are no 3-D views, no drawings of objects, in fact, there are no Hi-Res graphics at all. The graphics in *Scatterbrain* consist of Lo-Res text screen block graphics. These are used to draw a rectangle on the screen representing the room outline. Exits are indicated by holes left in the appropriate walls. Objects that are in the room are listed within the outline but are not graphics at all.

This is a fun game to play the first time through but is not for advanced Adventure players. Actually, *Scatterbrain* is not a true Adventure but more of a puzzle. You cannot manipulate the environment or objects other than to get or to drop things. There are only four verbs used; Get, Drop, Look, and Inventory. There are no dangers, no hidden passages, no traps, none of the action that is in the typical Adventure. At the same time, you don't have to worry about getting killed.

When you purchase a game from Pal Creations, you also receive a free game. The free game I received is *Better*. This is a gambling game for one to four players. The computer randomly picks a number between 1 and 20. Using imaginary money, the players place bets in various catagories such as "odd or even." The computer tabulates the results and determines when someone has won the game.

Both the *Scatterbrain* and *Better* games are entertaining and fun to play although neither is outstanding nor exceptional.

(Pal Creations, 10456 Amantha Ave., San Diego, CA 92126, 32K ECB tape, $14.95)

— James Ventling

No More Tape To Disk Incompatibility With *Triple Transfer Utility*

Adding a disk drive to your Color Computer can be very exciting. In fact, a friend of mine claims that he was more excited the day he bought his first disk drive than the day he was married. Talk about your typical hacker. Seriously, adding a disk drive has mixed blessings. With a new drive comes new tasks and responsibilities. For example, if you have lived without one for some time, you probably have many files that you will want to move to disk. In addition, some of your programs may need to be reworked because the engineers at Radio Shack, in their ultimate wisdom, pu the disk operating system buffer space in lower memory, right smack in the middle of everything. Machine language programs, if they use or load into this space, will not work correctly.

Along with the task of making these changes, the addition of a drive means backing up the information placed on the disks. This often is done by saving a spare copy of the disk files on cassette tape. If you value your time and data, this task must be done regularly. Murphy's Law works flawlessly with disk media. The minute that you let down your guard and skip a backup — zap — a non-recoverable disk error occurs.

This discussion wasn't meant to discourage any potential disk users but I want to make a point about the amount of work associated with converting and maintaining disk files. This work does not need to be time consuming because there are software tools available which are designed to aid in these tasks. This is a review about one such tool, a utility called *Triple Transfer Utility*, which can make tape and disk file transfers easier. *T-T-U* is designed to ease the chores of disk maintenance by providing several very useful functions. It moves programs from tape to disk and disk to tape. Nothing new here folks — utilities like this have been around a long time. What is unique and potentially very useful is that during the tape to disk transfer, machine language programs which load in the lower memory used by the disk operating system are fixed to run with the drive plugged in. This means that programs made incompatible by the addition of a disk drive can be fixed to work correctly.

T-T-U works in a straightforward fashion. When run, you are quizzed in menu fashion for the drive number and if you want a tape to disk transfer or vice versa. You then input whether it is a bulk transfer of all the programs on the media or if you want to be cued for each individual file encountered. The process of modifying an incompatible machine language file being transferred to disk is handled automatically. When a machine language program is encountered, its load addresses are displayed on the screen and *T-T-U* recognizes if a conflict exists with the disk work space. If there is a problem with the load address, the disk save is made by adding an offset to the normal addresses and a short routine is appended to the program to relocate it to its proper location when it is executed. The disk drive is also disabled in the process. All this is automatic with no user intervention. You are notified on the screen that the modification was made.

I tested *T-T-U* on several "disk incompatible" cassette programs from my library and *T-T-U* works as described. It helps in many, but not all, cases of incompatibility. The programs that can be fixed are those that load directly in the region of 0600 Hex, the disk work space. This is a majority of the problem programs. Those that are not fixable by *T-T-U* are programs that load in high memory but use lower memory (0600 Hex) as work space. This is an important distinction between disk incompatible programs. It should also be noted that this software is not intended to move copy-protected and auto-loading programs, although it may work with some copy protection schemes.

T-T-U gets excellent marks for documentation. For a "simple" utility, the six pages of detailed instructions leaves nothing to the imagination. More companies should follow this example. Misunderstood software of this type is frustrating and potentially dangerous if you are counting on a backup and it's not there.

T-T-U is a useful utility that can save time in tape to disk and disk to tape transfers. It can help alleviate the most common tape to disk incompatibility — programs that load into disk operating space. This is a valuable feature that makes this program different from other tape/disk transfer utilities. You could say that *T-T-U* is "30 percent more useful" than most transfer programs. If you need the help of this type of utility, *T-T-U* would be an excellent choice.

(Computize Inc., P.O. Box 207, Langhorne, PA 19047, cassette $19.95, disk $24.95)

— Tom Szlucha

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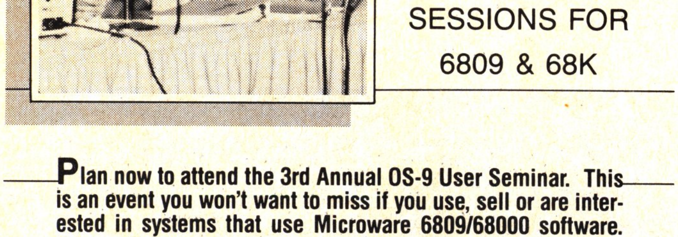
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Speed Math — An Educational Math Drill

Speed Math is an educational "game," furnished on cassette which requires 16K Extended Color BASIC. This "game" is a mathematics drill designed for children of grades two through 12 in which a student/player attempts to answer a number of arithmetic problems in a limited time. The number of problems, and the type (addition, subtraction, multiplication, division, or mixed) are selected by the player via menus. Time remaining in the game can be shown on either of two timers — a bar graph and a digital display —or "ticked off" on an audible timer. Or all three timers can be selected from a menu at the beginning of the game. At the conclusion of the drill, the player is rated on a six-step scale, ranging from "beginner" to "super whiz."

The instruction sheet is generally well-written. It describes the "game" and explains the choices the student/player must make from the program menus. The instructions were deficient only in that they did not tell how to load the program (use *CLOAD*, not *CLOADM*).

My two older children (in third and sixth grades) and I enjoyed this "game." The instructions, though generally well-written, were not really necessary because the program itself uses menus and one-line prompts to guide the player.

In summary, *Speed Math* is a good educational program, using simple but effective graphics (the timers) and a highly interactive format to encourage student/player participation.

(West Bay Company, Route 1, Box 666, White Stone, VA 22578, $8 tape)

— Jerry Oefelein

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MSI-Disk Util — For Better Disk Organization

Micro Services Inc. has designed an interesting program for the CoCo disk systems. *MSI—Disk Util* requires a 32K disk system and accommodates one to four disk drives. With it you can print out a directory of the diskette one at a time or combine them all into an alphabetical listing of each program or data file, store and restore the directory, and even assign a user-selected serial number to each disk.

The display screen is pleasing to the eye, as it is a 42 x 32-character screen display done in Hi-Res graphics. The multiple print command provides very nice printouts, complete with headers, diskette serial number, file type (BASIC program, data file, or machine language program), file format (binary or ASCII) and date last backed up. If the Print Single Diskette Directory command is used, the program provides you with the filename, format, grans allocated, bytes available (in the given number of granules), the number of bytes actually used, the number of bytes left unused, the percentage used of the allocated granules, and the start and end track/sector of the program.

Now for the improvements I feel that Micro Services should implement. First of all, when the program backs up a directory, it copies it to track 0. If track 0 is in use, the documentation tells you to use the display directory command to find out which file resides in that space and copy that file to another disk. It seems that the program could be made to do that for the user since that is a lot of trouble for the user to go to. Also, there seems to be a problem with the memory usage. Apparently some commands allocate variable space and do not "de-allocate" it when the command is finished. At any rate, there sometimes occurs an ?OM Error.

Also, the user cannot change the drive in use without restarting the program. That is to say, when the program starts, the user is asked for the drive number. After this number is entered, the only way to change the drive to be used is to end and restart the program, which requires reloading it. Another small change that could be made is to give a file count for the combined print command. When compiling the list for the combined print, the user has no way of telling the number of files already in the list and thus it is easy to add too many programs. This causes a loss of the entire list which the user will have to reload.

In general, if you are willing to work your way through these shortcomings, *MSI-Disk Util* can be very helpful in keeping track of all of your programs on all of your disks. Hopefully, Micro Services will offer a revision of their program. I feel that if they do, they will have a quality program well worth the $19.95 price tag.

By the way, all of the software pirates should beware; the program is very skillfully protected with a "personal identification plug" to be plugged into the left joystick port. The documentation states that *MSI-Disk Util* will not run without this plug. This will guard against unauthorized access to your files.

(Delker Electronics, P.O. Box 897, Smyrna, TN 37167, disk $19.95)

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Adventure Generator — An Adventure In Creativity

By Ken Boyle

Hear Ye! Hear Ye! Step right up! Do I hear you say you're tired of being pushed around in someone else's Adventure? Are you constantly being frustrated by vain attempts to solve puzzles created by the devious minds of certain other programmers? Do you want revenge? Do you want to be in control of yourself for a change? Then read on, Jarb Software and author Bill Cook may have just the thing you're looking for.

All kidding aside, if you have ever wished you could write your own Adventure but didn't know where to start, Jarb Software has just released a new program for our favorite computer that will actually write a BASIC text Adventure program for you. *Adventure Generator* is written in Extended BASIC and requires 32K. However, before you get too excited, let me discuss a few prerequisites.

First of all, *Adventure Generator* can only write a BASIC program (no small feat) from your input. This means all the creativity necessary to develop the Adventure story-line and puzzle logic must come from you. This is in no way a limitation, but you must realize this piece of software is not going to automatically create Adventures for you to play. In fact, just the opposite is true; *Adventure Generator* will allow you to program Adventures for other people to play.

The second prerequisite is a knowledge of BASIC programming. Although 70 to 90 percent of the actual code is generated in response to simple questions, the remaining 10 to 30 percent requires you have at least an average programming ability. What does average mean? Well, you should be able to understand the coding of *IF . . . THEN* statements including the use of the conditionals *AND* and *OR*. Also, you must know simple syntax rules such as when a colon is required to separate BASIC statements and when it is not. And finally, you should have an understanding of the structure and use of arrays, both single and multi-dimensioned.

Obviously, the more complete your programming knowledge is, the better your chances are of generating a successful Adventure. And while it is true that even someone with minimal skill could generate an Adventure using this program, should that person make a subtle mistake in answering the questions, it might be impossible for them to find the actual bug in the generated code.

Adventure Generator is available on cassette or disk with a sample Adventure and 31 pages of documentation. The Extended BASIC program is preceded by a machine language auto-start program and, hence, requires a *CLOADM* for cassette loading.

Perhaps the thing that impressed me most is the professionalism which has gone into the development of this software package. This is evident in the extremely thorough documentation and the genuine user-friendliness of the program itself.

The documentation contains instructions on the use of *Adventure Generator*, as well as two helpful appendices. Appendix A contains detailed step-by-step instructions on the creation of the sample Adventure provided, including a map of the Adventure and a discussion of how to go about creating a similar map of your own Adventures. The second appendix carries the detailing of the sample Adventure one step further by providing a commented source listing. This appendix will give you much of the knowledge necessary to make your own personalized enhancements to any Adventures you may generate, as well as provide you with an invaluable debugging tool. As many of you may have already experienced, documentation can usually make or break a good program. Other companies would do well to follow the example set forth by Jarb Software and author Bill Cook in this package.

Now let me discuss the program itself. Many reviewers have been accused of presenting too rosy a picture of software reviewed and I try to keep this in mind at all times. This program, like most others, has a few limitations which I will discuss later, however I must congratulate Bill Cook on writing a very professional user-friendly program. The screen displays for data entry are very well done and most entries provide a mask indicating just how many characters are permitted. Being a professional programmer, I can appreciate the extra effort necessary to turn a good program into something even better.

The program is divided into five sections; 1) room descriptions, 2) verb input, 3) object descriptions, 4) object placement and 5) conditional input. The first section allows you to enter up to 100 room descriptions and the entrance/exit relationships between rooms. Section 2 allows entering of a maximum of 30 action verbs. Several of the verbs have been preprogrammed for all Adventures such as INVENTORY, SCORE, QUIT, HELP and LOOK. In section 3 you can enter descriptions for up to 60 objects. Each description must include a single keyword to be used with the verbs by the Adventure player. Also, after each of the first three sections is complete, you may request a printout of your entries, (provided, of course, you have a printer on your system.)

Since there really isn't enough room in a 32K machine for *Adventure Generator* and the generated Adventure, the program writes to either your cassette recorder or disk drive continually during the entire generation process. This approach seems better suited to disk users than to us, less fortunate, cassette users. For the record, I used a Radio Shack CTR-80A recorder and a good quality tape and had no problems whatsoever. However, if you have been having any I/O problems while doing normal *CLOADs*, etc., with your current recorder, you could be in for some headaches. To spend two or more hours entering an Adventure, only to have some form of I/O problem when you're finished, is not my idea of how to spend an enjoyable evening. Unfortunately, at that point there is no way to recover any of your work and you will have to repeat the entire process. At least with normal programming you can do a *SKIPF* to verify your save. This is part of what I consider to be the one serious limitation of this well done program when used on a cassette based system. Another part of the problem is that you must complete the entire data entry process at one sitting. There is no way to spread the generation over several sessions. If you begin with a very well planned Adventure (this is a necessity) you could complete a rather short program in under an hour, however for longer Adventures several hours could easily be the norm. Of course, as you gain experience using the program your actual data entry time may decrease. Nevertheless, I prefer to create my programs in modules, testing each section before continuing on to the next. *Adventure Generator* forces me to take a different approach and old habits die hard. Also, after generating the Adventure, should you decide you need another verb, object or some other change, you will have to manually code it into the program. There is no way to use this program to update a previously generated Adventure. Let me stress, however, that these are not necessarily problems or faults with the program, only limitations which should be considered in your purchasing decision.

To continue on with the actual generating procedure, once you complete entering rooms, verbs and objects, you must tie them all together. Section 4 (object placement) allows you to specify in which room each object will be placed at the beginning of your Adventure. Now we come to the final section, conditional input. Inputting data to this section requires probably 80 percent of the total time involved in using this program. This section will prompt you with each verb and allow you to enter any associated objects. You may then select from several conditions for the verb/object combination to be successful. Conditions such as the object must be in the current room or in your inventory, a conditional flag must be set or even a random factor are some of the possible choices. After the conditions are selected, a menu of results is displayed. You may then choose such results as "object disappears," "place object in room," "set or turn off conditional flag," "print a response," etc. Just about every imaginable option is included. Also the BASIC code being generated is displayed on the screen, allowing you to manually edit the line if required. You are allowed up to nine conditional flags (switches). These may be used for special situations to trigger responses to a combination of actions.

Now, you might wonder just what the final result is after all this data entry. Well, the actual program generated is very well done and the code is fairly easy to follow. The content of the Adventure is, of course, exactly what you entered, no better no worse. It seems to me the Adventure screen displays lack some of the sophistication apparent in the generator program itself. There are no fancy split screens. The information simply scrolls off the screen in the normal manner. Unfortunately, you are not given obvious directions for each room, nor are you allowed to save a game in progress. Of course, you can add these things yourself but it would have been nice if they had been included.

All in all, Mr. Cook and Jarb Software have done an admirable job of creating an *Adventure Generator* and I can honestly recommend it to anyone interested. Of course, the program may not be perfect for everyone and I hope my comments give you the additional information you need in deciding to purchase this program or not.

As a final note, I would like to add that *Adventure Generator* could be very successful when used as an educational tool. The amount of creativity and logical approach necessary for developing an Adventure would undoubtedly benefit students in all areas of interest. But primarily, for a student interested in programming, developing an Adventure and writing a computer program have a great many similarities. Also, once the program is generated, the student could then experiment with changing codes to enhance the program and gain programming experience at the same time. I'm sure an experienced teacher could envision even more possibilities! Now if someone would only create a review generator.

(Jarb Software, 1636 D Avenue, Suite C, National City, CA 92050, cassette $34.95, disk/Amdisk $39.95)

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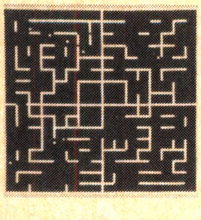

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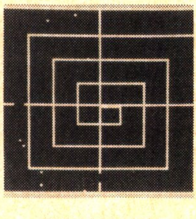

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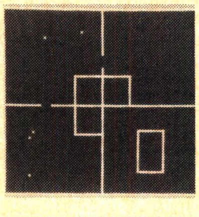

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One problem that TRS-80 users have often noticed (not only on the CoCo, but with the Model I, III and 4 as well) is that the connections to disk drives and other peripherals are often poor. Radio Shack's computer products (except for disk drives) have had the card edges tinned with solder, while the connectors that fit on the edges are often gold-plated. The chemical reaction between gold on one side and tin on the other often causes oxidation on the solder side. Some people have had a jeweler electroplate gold or silver on the card edges of a board, while others have used silver solder to coat the pins; one neat trick that one of my friends did was to put a large glob of solder on each pin, so that the connector pins were under tension and made a better connection.

E.A.P. Company's solution to the connector problem is to replace the card edge with a gold-plated connector designed to mate with standard edge connectors. The Gold Plugs, which are available in several sizes for different applications, are soldered onto the existing card edge. This gives you a true gold-to-gold connection (or, at the very least, a good connection between different metals). They have several different connector kits, with the appropriate connectors for various computers; the kit I tested is the one for the CoCo's disk controller pack. This has one 40-pin connector (computer side) and one 34-pin (drive side). This particular kit also has extension tabs for the grounding pins on the sides of the 40-pin card edge; the grounding pins provide a better ground connection from the controller and drives to the computer, and help keep RF interference down. (Incidentally, every other wire in the CoCo's drive cable is grounded at both ends; this reduces noise and makes disk operation more reliable.)

After I soldered the pins on the top of the controller, I pulled it out, took the board out of the case and soldered the other side. The drive end is easier because it doesn't have to be at a particular angle; mine ended up tilted about five degrees, which doesn't help the appearance but doesn't affect the system's operation.

The ground extender tabs were more difficult; four tabs are provided, and they go on both sides of each of the two ground pins in such a way that they just fit into the ground clips on the computer when the controller is plugged in. If the tabs are too far out, the controller won't go in all the way. The instructions are complete and easily understood.

As for the improvement that the Gold Plugs achieve, I installed the kit on a controller that was working normally and I can only say that the controller works fine with the Gold Plugs, with no intermittents (loose connections) or other problems. One of the disk controllers at THE RAINBOW office has been rather flaky, though, and since the trouble was cured (for the moment) by a good cleaning, the Gold Plugs may well help on it. If you are having this kind of trouble, the Gold Plug 80 kit is definitely a good solution.

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— Ed Ellers

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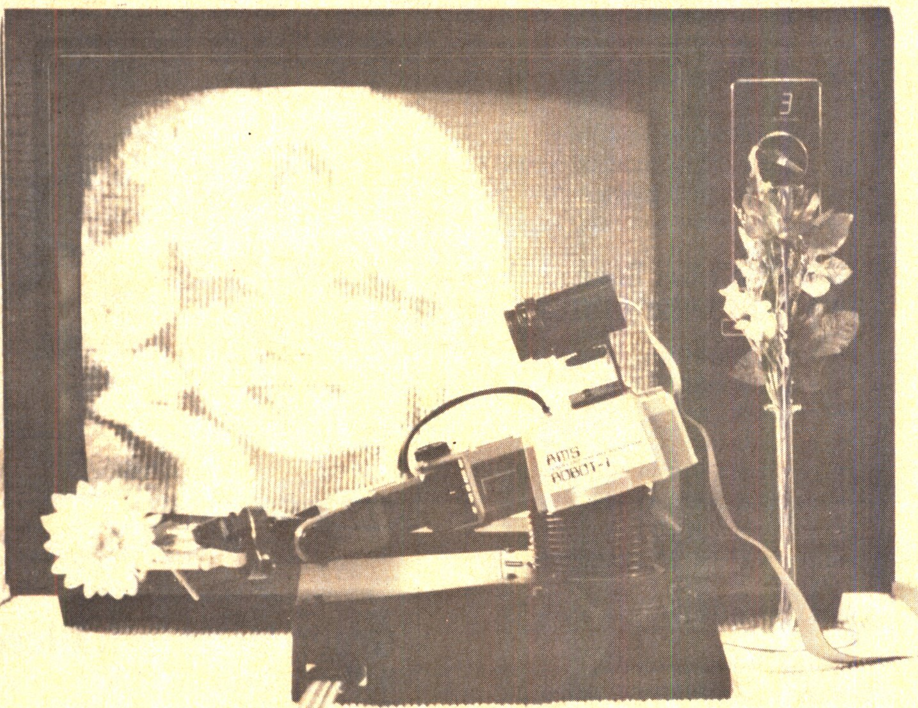

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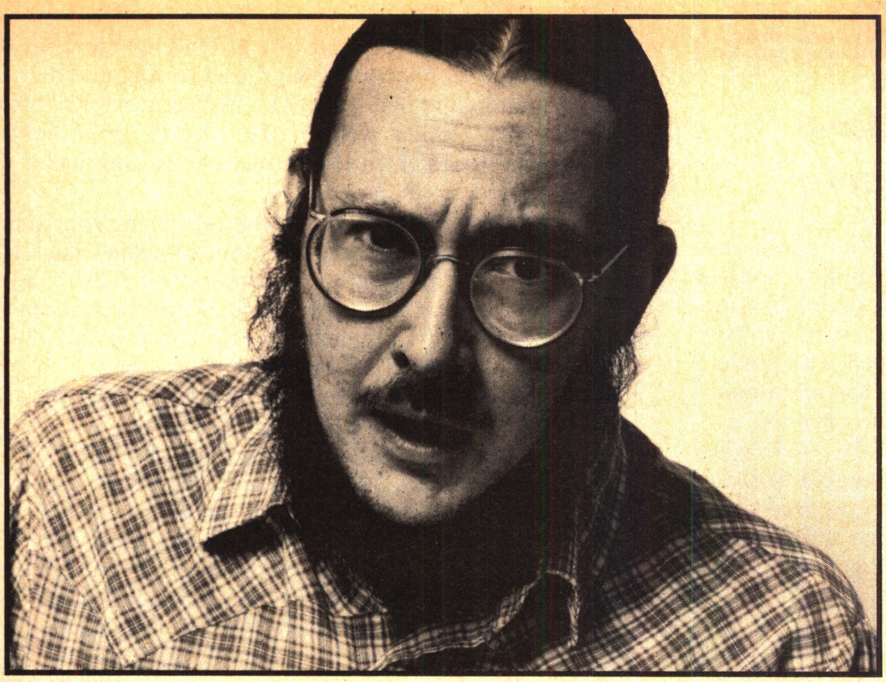

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So how can it be good if it's so inexpensive? First of all, you can only get a Color Burner from Green Mountain Micro. No dealers are adding to its price. Second, it isn't fancy. No high-tech power supplies are in sight. You've got to add three homely, low-tech 9-volt batteries to get it going. Finally, it won't set new standards of complexity. It's simple, hardworking and reliable.

You can get your Color Burner complete or *a la carte*: try an assembled and tested unit, a kit, or just a bare board. Order it with or without programming software. Both kits and assembled units come with over 40 pages of documentation, complete program listings, and schematics. Nothing is hidden.

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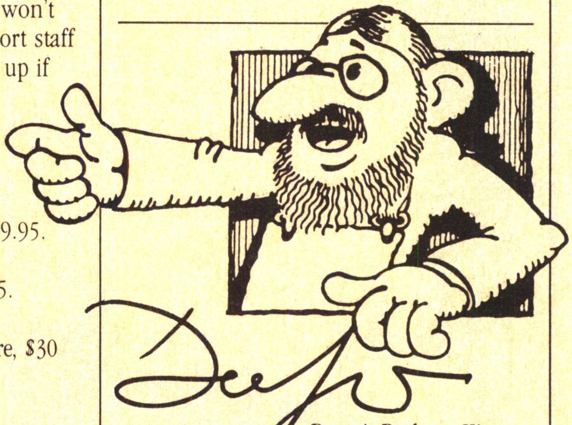

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Software Review

Colorama BBS: A First-Class Bulletin Board Package

By Ed Ellers

The telecommunications explosion these days seems to be feeding upon itself. First, personal computer owners got modems so they could log in to a mainframe at school or work. Then services like CompuServe and The Source were introduced, and the first bulletin boards popped up. This gave more people a reason to have a modem; when modem use grew, more bulletin boards came up as well as new services like Dow Jones News/Retrieval and Delphi. Still more people discovered them, and more popped up: I read a message on CompuServe recently about a directory of over one thousand BBS systems nationwide. In my area (Louisville, Ky.), we have seven boards available, with more to come. It's not surprising that quite a few people are now interested in starting a BBS of their own. Some want to do it for their computer club, while others are putting in systems geared to special interests (like pilots and astronomers), and many just want to add another general-interest board to those in their area. The first BBS SYStem OPerators, "SYSOPs," were seasoned hackers who wrote their own software to do it, but most systems now are running on commercial packages. The *Colorama BBS* is one such package for the CoCo, with features that make it especially geared towards CoCo users.

The *Colorama BBS* requires a 64K CoCo with one drive, and an auto-answer modem (unless you want to sit by the phone and answer it manually). *Colorama BBS* can use up to four drives and, if you have double-sided drives, Ceratec will supply a patch to use them. The Colorama Headquarters board is being run on three double-sided drives and has over a megabyte of disk space. As for the modem, most auto-answer units will work; one that doesn't cost a lot is the Novation J-CAT, reviewed in the June 1984 RAINBOW. The manual says that the Hayes Smartmodem will work only with some special tricks; I did not try it.

One thing about running a BBS is that it involves some work on your part in maintaining files, setting up access levels and customizing the program to suit the kind of system you intend to run. *Colorama BBS* does run as is when *you* get it, but you do need to write up a couple of welcome messages and an update message, and other files may have to be created for the news section and such. This can be done using any word processor that handles ASCII disk files. If you aren't planning to use certain sections of the BBS (such as product ordering), you can delete them from the program. This is not something for someone who doesn't know much about computers.

The manual is intended for an experienced CoCo user; if it were telling you how to hook up a video recorder, it would probably say "Connect your antenna to the VCR and then connect the VCR to your TV set" and expect you to know which input and output is which, what the difference is between VHF and UHF, and what 300-ohm twinlead and 75-ohm coaxial cable are. The manual is fairly complete; Ceratec put out a new version while I was testing the program, and they sent it to me on request.

Ceratec's update policy is very good; if an entirely new version is issued, they will give it to you free within 60 days of your purchase if you send them a diskette. If minor changes are made, they will be listed on the headquarters BBS and can be downloaded free. (To become eligible, just call the BBS and leave a message to the SYSOP with the serial number of your copy.) In fact, the manual tells you to make a backup of the master disk and send the master back to Ceratec so that you can get the latest version as soon as possible in case an update was issued after your copy arrived at the dealer.

When you call in to the system, you get a dead carrier at first, since *Colorama BBS* has no way to detect your carrier. Hitting any key lets the BBS know that someone is on line, and it asks for your account number or the word "NEW" to start. If you answer "NEW," it asks for your name and address, and then asks if you have a *VIDTEX*-compatible terminal program. As a new user, the first thing you see is a sign-on message created by the SYSOP welcoming you to the board. Once you have logged on, you can explore the system at will; no further "validation" is required, as it is on some other boards. (If you intend to run a "closed" system, the manual tells how to modify the program to use passwords instead of account numbers.) There are also special private sections that the SYSOP can set up (say for club members), and the SYSOP has a number of special functions available to him as well. Both a public bulletin board and user-to-user electronic mail are available.

The *Colorama BBS* has, in addition to regular message functions, a product boutique and ordering section (for those who want to run a mail-order business), a game-playing section where you can let callers play BASIC game programs on your computer, a news section for whatever interesting items you can think of, and a download section for public-domain programs. (*Colorama BBS* doesn't support the more common binary transfer protocols, so machine-language programs can only be downloaded using *Disk Colorcom/E Version 2*; other terminal programs will be limited to ASCII files.)

Colorama BBS also features color graphics, using the semigraphics 4 protocol (ESC G 4 to turn on, ESC G N to turn off) devised by CompuServe and supported by Radio Shack's *Videotex* and *Micro Color Compac*, CompuServe's *VIDTEX*, Eigen Systems' *Colorcom/E* and other terminal programs for the CoCo, MC-10 and other computers. There is a special section devoted to graphic pictures on the board as well. (If you would like to see a *Colorama BBS* system in action, the headquarters number is 512-285-5028.) Finally, users can find out who the other users are, and if someone has trouble figuring out the commands two different help files are available.

One problem that *Colorama BBS* has is its incompatibility with certain terminal programs. While testing the system, I had several friends call in; Seth Strattan, a Model I user who was running a homebrew terminal program, got a number of errors. When RAINBOW Technical Editor Dan Downard called in using Softlaw's *VIP Terminal*, he got the same results, as I did when I called the headquarters board using *VIP*. Peter Banz, author of the *Colorama BBS* program, tells me that other SYSOPs and users also have had this problem; he says that it's being worked on.

Colorama BBS is one nice piece of work, with a good number of features and reliable operation. I don't have any qualms about recommending it to anyone who wants a good BBS for the CoCo.

(Spectrum Projects, 93-15 86th Drive, Woodhaven, NY 11421, $99.95 plus $3 S/H; produced by Ceratec, Inc.)

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Semigraf: A Color Graphics Editor For The Doodler

It seems that there are a considerable number of graphics editor programs available for the Color Computer. Is there room for one more? I'll try to answer that question in this review of *Semigraf*, a new color graphics editor marketed by Sugar Software for the amateur and professional "doodler."

The uniqueness of *Semigraf* is that it allows the use of graphics editing and picture creation in the semigraphics mode. The most significant advantage of this mode is that both text and graphics are available on the screen at the same time. This effect can be achieved with Color BASIC by using the *SET* and *RESET* commands to turn on graphics blocks amongst text but this is obviously rather tedious. Using the semigraph mode, the resolution is somewhat restrictive, from low at 64 x 64 (blocks horizontal by blocks vertical), medium at 64 x 96, to high at 64 x 192. It is obvious that the various semigraphics modes do not come close to the resolution available in the normal graphics mode. As a positive tradeoff for the lack of resolution is the ability to display all eight colors plus black simultaneously on the screen with reasonable memory usage. There is 2K used for the low resolution mode, 3K for medium and 6K for the highest resolution.

The editor is straightforward and relatively easy to use. The cursor, a small horizontal line, is moved about the screen with the arrow keys. Its movement is used to draw or erase lines on the display. In other words, it acts like a computerized etch-a-sketch device. In addition to the arrow key movement, there are several other predefined control keys which allow the cursor to be positioned quickly. These include horizontal and vertical tab commands, as well as home and center-of-the-screen position commands. There are commands to fill (paint) large areas with the foreground color as well as to change the colors available for drawing, painting or used as the background. A series of commands is included that allows changing from graphics to text mode. Both the normal Color Computer text can be generated on the screen as well as large "block letters." These "block letters" are proportionally spaced and occupy 10-16 characters per line, with eight lines per screen in low resolution, 12 in medium and 24 in the high resolution semigraphics mode. This large text capability is a definite plus to this software if the graphics being drawn require labeling. The editor lacks a circle command probably because a circle would look too "choppy" at these resolutions.

I will admit that my first impression of *Semigraf*, was that it was rather spartan. Since I found the program so easy to use, subconsciously I must have felt that something was missing. But simplicity does not mean lack of capability. I have seen and used several graphics editors of similar capability, *Semigraf* is by far the easiest to use.

There are a couple of useful features built into *Semigraf* not often found in other software of this type. For instance, there are two built-in screen print programs, one that allows hard copy to be sent to an Epson printer (or equivalent), and another that interfaces to a printer which supports the TRS-80 block graphics. I tested the latter with a Microline 82A printer and it worked well.

With any program of this type, there is a series of new commands to master. Since *Semigraf* achieves its functions in a simple fashion, mastery is not difficult. Most commands require only a single keystroke, and at most, two are used. Since the functions are named logically, they are easier to memorize. The instruction booklet, being concise and well written, also aids the learning process. Included with the software are data files which create several demonstration screens showing the potential of *Semigraf*. They leave no doubt that very professional title screens and slides can be made with this software.

Semigraf is available in cassette and disk configuration. The major difference in versions is the media to store and retrieve data files, with the disk version having the capability to support both tape and disk storage.

Overall, *Semigraf* represents a quality product which is a good value for the features being offered. The potential purchaser should keep in mind that the screen resolution used with this software is limited when compared to the highest resolution capability of the CoCo. This must be weighed against memory usage and color selection available as well as the many features offered with this product.

(Sugar Software, 2153 Leah Lane, Reynoldsburg, OH 43068, 16K Color BASIC or Extended Color BASIC tape $19.95, disk version $24.95)

— Tom Szlucha

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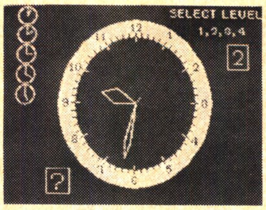

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Funhouse — A Non-Violent Adventure

Long ago, when I was a teenager in the late '50s and early '60s, one of my favorite pastimes was a visit to Chicago's famous Riverview Park. Among its many rides and attractions, one of the most memorable was Aladdin's Castle, Riverview's version of the fun house. It was, therefore, with a great deal of nostalgia that I looked forward to playing Pal Creation's new 32K ECB text Adventure called *Funhouse*.

Funhouse follows the basic format of other text Adventures allowing for two-word entry of commands. Its many features range from the very nice to the somewhat disappointing. As indicated, it requires 32K and Extended BASIC. It is written entirely in BASIC and for those of you who may get frustrated enough to resort to listing the program, it is commented to make it easier to understand.

As suggested by the title, the Adventure takes place in an amusement park fun house. Once you figure out how to get in, you don't just walk in the front door, you must then figure out how to get back out. However, winning involves not only getting out but gathering enough information on your journey to answer several questions at the end. In other words, pay attention! You'll be quizzed later. To make it even more interesting the answers to the questions vary from game to game.

One of the helpful features of the game is a list of all the verbs used. This list is displayed whenever you use an unknown verb. Some of you more diehard Adventurers might think this makes it too easy, however after getting "I DON'T UNDERSTAND!" in response to 80 percent of my commands in most games, it was refreshing to be able to get intelligent responses to all commands in *Funhouse*.

The fun house itself consists of just what you would expect. That is, dark hallways, secret passageways, rooms full of mirrors and more including a somewhat frustrating maze. Some day I would like to play an Adventure without an endless maze built in. The maze in *Funhouse* is one of the disappointments. It is illogical, that is impossible to map, and just plain boring. Staying out of the maze is the only way to have any fun. Unfortunately, much of the floor plan for *Funhouse* is also illogical and in many cases randomly decided each time you leave a room. This means it is almost impossible to retrace your steps and play the game in a logical manner. Many people may find this more of a challenge and if so, fine. I however, prefer a more logical approach to puzzles. Perhaps this is the result of having been a professional programmer for the last 15 years. For whatever reason I have, you will have to decide for yourself.

One of the "nice for a change" things about *Funhouse* is you won't die a thousand deaths as in many Adventures. In fact, you won't even die once. *Funhouse* is definitely a non-violent Adventure. Because of this, you will not be constantly starting over every 15 minutes. Not getting killed along with a somewhat random layout results in fairly long Adventures and it would have been nice to be able to save a game in progress for completion at a later date. Unfortunately, the authors chose not to include this option.

On the plus side Pal Creations has chosen to promote their Adventure games by offering a second game free with the purchase of any Adventure. There are several free games to choose from and with a combined price tag of $14.95, this becomes a very attractive offering even with my criticisms. The free games seem to be good games that can stand on their own merit. The game I received is called *Ski Lodge* and involves managing a winter ski lodge with the intention of making a financial profit. It is a fairly good simulation and should please people interested in this form of entertainment.

While I wouldn't place this Adventure at the same level as, say, a Scott Adam's classic, it is nevertheless a decent game in its own right. With a reasonable price plus a free game, it could be a worthwhile addition to your software library.

(Pal Creations, 10456 Amantha Ave., San Diego, CA 92126, cassette $14.95)

— Ken Boyle

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Pass The Time With *Retirement Planning Model*

Retirement Planning Model has a very good use, but I would say the market for the program is somewhat limited and the price is high.

Let me make it very clear that *Retirement Planning Model* does exactly what it says it will do in fine style. It will provide you with varied looks at your retirement as influenced by different sets of circumstances. If you own a printer, you can get very neatly printed charts which show what your status will be at a particular age, and how early retirement may affect your long-range goals.

Young people should take advantage of this tool, and older persons or middle-aged folks can benefit from the information generated by the program.

That is all true, but I am inclined to look at the overall usefulness of the program and say, "For this kind of money it ought to do more!" Honestly, I do not know what I expected.

I was interested in the results in respect to my own retirement but once I had run the program on my 32K "F" board machine — the thrill was gone. I do suppose I might crank the program up again at a later date and I suppose I might run the numbers by one more time, but I really felt there should be something more for this kind of money.

I spoke with Paul G. Parker, the author and vendor of the program, and he said he felt there was a need indicated for persons over 40 years of age and they could benefit from the information.

I did not convey my misgivings about the program to Paul when I spoke with him, but I did indicate I felt it did what it was supposed to do, but it was limited.

Paul voiced the feeling that one could use the program at least once a year using updated figures from investments and the like.

He said he originally devised the *Retirement Planning Model* for his own purposes and then decided to market it. He has authored several other programs in the business and real estate field and intends to do more.

It is a very easy program to operate, but does require some homework to be truly effective.

There are worksheets with the program on which you list the statistics you will need for the program. The sheet follows the order of input and helps you to assemble the proper stats. If you have a copy machine handy, I think it would be a good idea to run off a couple of extras.

You must enter your age and that of your spouse. Therein is a problem which is fixable. The program does not take into consideration there are those of us who are single. I used a zero for the wife's age, and it seemed to work. You can also modify that line, as you can with several other entries.

The documentation supplied is adequate so far as the software operation is concerned, but does assume everyone will know some of the technical aspects of retirement and taxation. I liked the format and size of the manual and found it easy to have in hand when I needed it.

I operated the program from both disk and tape. Tape loads in about two minutes and is exactly the same as disk as far as I can see.

The documentation says you must *PCLEAR1* for 16K machines.

You are walked through the steps of *Retirement Planning Model* by the prompts, which are very clear. If you make out a worksheet, the going is very easy.

Retirement Planning Model is a good program. It does what it says. It has a good purpose to exist, but I think the price tag is quite high for such a limited use.

(A&P Software, P.O. Box 202, Glenview, IL 60025, $34.95 tape, $39.95 disk)

— Howard L. Ball

Hint . . .

Polling The Keyboard

If you need to wait for a key to be pressed before continuing on with a program, insert *EXEC 44539* at the desired point in the program and the computer will go "on hold" until any key is pressed.

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Mul-T-Screen Is A Colorful Character Generator

By Robert Foiles

Mul-T-Screen is the first product by Incentive Software, a new software company in Ontario, Canada. I read the manual and even though the Canadian influence in spelling was here and there in the text, it did not confuse the straightforward directions.

It is not often that a reviewer gets to take a second look at a product before the review appears in print. However, Mr. Vitold Gornicz, *Mul-T-Screen's* creator, had an upgrade of his program in the mail before the review on the first version was even in print. In this case, the *upgrade* is really an *upgrade* since there were no apparent bugs to correct in the first version.

Mul-T-Screen is a programmer's utility which provides the graphic "bells and whistles" to make the screen more colorful and interesting. The program is supplied on a "protected disk" and tape and they are interchangeable.

The upgrade now has the ability to utilize the full 64K. The opening menu allows the 64K user to load *Mul-T-Screen* on top of ROM. The upgrade also allows for the 32K units to use the full 224-character set. The 16K user must follow instructions in the manual to "dump" some features to save enough memory for the user's program. The disk version upgrade also includes another program which is a character generator and editor. (More on this most interesting program later.) Also, *Mul-T-Screen* versions for use with Gemini and Epson printers are available, as well as the Radio Shack DMP type printers. Another "fun" addition in the upgrade is a sample "space game" to be used as an example of using *Mul-T-Screen* to create text and graphics programs.

The character generator program is very useful. Any of the 224-character set can be called up and modified, or changed. The program author provided the user the ability to modify each of the characters pixel by pixel. The user may start off with any key from the keyboard or call a character by its ASCII code and actually change its graphics appearance. The two pages of instruction made the use of the generator/editor sound very complex. But when the option is up and running, it is so simple to move through the system that one does not have to refer to the written instructions a second time. The program author used his own program to write the generator/editor, and for the hackers or students, looking through the BASIC program is a very useful teaching tool on using *Mul-T-Screen*.

Since the program produces visual output, it is a little difficult to describe its features. At some point most readers may have seen the service program of a cable TV station. The type of screen messages like time and temperature on the top line and a message scrolling in the middle of the screen and another message line scrolling along the bottom of the screen. Well, *Mul-T-Screen* can produce such a multi-message screen and in selectable colors. It allows control over the size of the copy; color of the characters; background color; underlining on screen; and even printing text vertically.

The programmer is able to create any of the features by including the codes for the function desired in his or her program. The codes are entered as a series of *PRINT CHR$(n)* concatenated. Then to debug the new program, *Mul-T-Screen* can be loaded and the special trace function used. In this operation, the line number, which is being executed, appears on the bottom of the screen while above it the results of the graphics program are displayed.

Mul-T-Screen was written to work on Color Computers with or without Extended BASIC and it has the ability to test memory size of the CoCo and adjust to either 16K, 32K, or 64K. The program is relocatable if an offset is used at the time of loading (it must be in a multiple of 256 bytes to satisfy direct page requirements). *Mul-T-Screen* uses a total of 4.5K bytes and if your program needs more memory, *Mul-T-Screen* provides a way to surrender some functions for more usable memory.

Beside all the graphics controls included in the program, *Mul-T-Screen* has a very effective screen dump routine (either as positive or negative images). The printout can be full-size (paper size, that is) or "mini"-size (3½ x 2½). The position of the printout is also controllable. The default Baud rate is 600, and it will print out on a DMP-200 (printer used in the testing).

The manual is printed on an 8½" by 11" dot matrix printout folded in half. This produces 16 pages of text and the rear panel of the cover is used to summarize all the codes for quick reference. The disk version had a short note in the sleeve noting one might wish to look at the "info" program first. The program author used this program to add a small correction to the manual and offer some advice on using the program.

One criticism of the instructions in the manual is that not until the reader gets to Page 7 does the program author indicate that all programming instructions must be followed by a semicolon. Also, there is no index or cross reference, which means the user must page back and forth to find the section needed.

A little disconcerting is the program author's offer to provide additional information or answer questions on the program if you include $1 with your letter to cover postage and handling. This type of "after-sale-support-for-pay" may be necessary, but this policy does not appear to be a very user-friendly support plan from a new software company looking for new business.

(Incentive Software, P.O. Box 323, Station B, London, Ontario, Canada N6A 4W1, tape $24.95 U.S., disk $27.95 U.S.)

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Hardware Review

Let CoCo Talk Back With *'The Voice'*

Speech synthesis is one of the newest and most exciting developments in the computer industry today. Developments in this area are available for the Color Computer through a hardware and software system called "The Voice" by Speech Systems. The hardware portion of this system plugs into the cartridge slot of your computer. (If you desire to use disk drive you will need to use an expansion interface or Y-cable, otherwise a tape player is necessary to load and save programs.) Sound output can be channeled through your monitor speaker, a separate 8-ohm speaker, or your hi-fi system. Loudness and pitch of the output can be adjusted through separate volume and frequency controls located on the side of the cartridge.

The Voice can be used with 16K, 32K, or 64K Color Computers and comes with a number of programs. Some of the programs are for demonstration and the others are utility programs which enable the development of speech for inclusion into your own programs. The utility programs provided give two completely different methods of adding speech to your own programs. Using one method, you develop speech by manipulating separate sound units. The other method utilizes a translator program which greatly simplifies the process.

Quite naturally, before digging too deeply into the manual, I wanted to hear what sounds would be produced by this new black box connected to my cartridge slot. I plugged in The Voice, turned on my computer and loaded a demonstration program called *Bingo*. After setting the time between calls and deciding how many times each call would be made (once or twice) an amazingly clear "N38" was sounded by my television speaker. The sound produced had a somewhat nasal, monotone quality but was definitely understandable. I didn't have any bingo cards handy; however, an enjoyable game could be conducted using your CoCo as announcer.

Next I loaded a game called *HiLo*. In this game a number is chosen between one and 100 which you must guess in a maximum of five tries. Again everything said by The Voice was quite understandable. While looking at this program I had some help from my elementary and preschool age nephews and nieces who were quite captivated by responses made to their guesses.

The first method I chose for producing speech turned out to be the most time-consuming; however, it was also the most interesting. Using this method requires a knowledge of how sounds are put together to form words rather than how words are spelled.

The Voice uses a method of reproducing speech based on the use of phonemes. A phoneme is an isolated speech sound. Through the right combination of these sounds, any word in the English language and many words of other languages can be reproduced. By using an SC-01 speech synthesizer chip, 25 consonant sounds, 36 vowel sounds and three pauses are possible. The phonemes generated by the synthesizer have been optimized for "standard" American or mid-western English.

A table located in the manual lists the available phoneme mnemonics, with a numeric code (both hexadecimal and decimal), duration, and an example word for each. To develop a word, the proper phoneme mnemonics must be strung together. Using this method you will need to pay close attention to how words sound and not necessarily to how they are spelled.

An editing program supplied with The Voice allows you to experiment with the construction of words through the phoneme method. It contains several easy to use editing features such as Insert, Hack, Delete, Change, Print, Tape or Disk Storage, Speak, and cursor movement. My first experience with this program came during the winter holiday season at which time I decided to wish myself a "Merry Christmas and a Happy New Year." After some experimentation and numerous listenings the following phoneme list was developed using the editor:

```
M EH1 R R Y PA1 CH R I S M UH1 UH1 S PA1 AE
N D PA1 UH2 UH3 PA1 H AE1 EH3 P Y PA1 N U1
U1 PA1 Y1 AY I3 R
```

By pressing 'S' a satisfactory greeting was extended to myself and all those in the immediate vicinity.

The manual contains a dictionary of over 150 commonly used words with their phonetic counterparts. I found the dictionary quite useful, particularly since this was my first experience with computer speech synthesis. The table of phonemes, however, was a little troublesome to use. The phonemes are listed in their numerical code order rather than alphabetical order. This made it a little cumbersome to look up phonemes for words not contained in the dictionary.

The editor allows you to experiment with the phonetic generation of words. The results can be listened to, changed,

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POSTPAID. VA ADD 4% TAX. SEND SASE FOR PROGRAMS LIST

saved, and printed. They are not immediately usable with a program of your own choosing. Before being incorporated into a separate program, each phoneme mnemonic must be converted into either its hexadecimal or decimal equivalent. This conversion can be accomplished by using the phoneme table in the manual or through the print mode from the editor. When 'P' is pressed from the editor, mnemonics used and their decimal equivalents are listed. For example, the mnemonics for the word "merry" which I used above appeared on the printout as follows:

```
M ( 12 ) EH1 ( 2 ) R ( 43 ) R ( 43 ) Y ( 41 )
```

These numbers along with a short machine level routine can then be poked into memory through your self-written program in order to have speech from your own software. The manual contains two program examples ready to be typed in as demonstrations of how this procedure should be accomplished.

An important set of programs is provided along with The Voice to make the addition of speech to your own programs much easier and quicker than the above process. The main program in this set is called *The Translator* and is a separate piece of software which will automatically pronounce words without having to use the editor. *The Translator* comes in two versions, one for 32K CoCos and the other for 16Ks. There are eight separate programs for 32K and seven for 16K in this software package. Both versions contain a program called *Speak*, the *Translator* program itself, a dictionary (two for 32K), a set of dictionary managers and two demonstration programs.

Speak is a text-to-speech program which makes use of *The Translator* (and one of the supplied dictionaries). It enables short phrases and sentences to be spoken immediately after typing in (using normal spelling) and pressing ENTER. Three modes of operation are available. A direct mode (just described), a build text mode which allows more than one line to be input at a time, and an I/O mode to allow saving and listening to text from tape or disk files. I found that the sentences I tried were clearly understandable, but the flow of speech was at times a bit jumpy. The results were not quite as smooth as one would expect from normal speech.

You may also create your own BASIC program and use *The Translator* to produce speech output from The Voice. To do this, *The Translator* along with a dictionary, must reside in memory, and then the desired phrase or word placed into a string variable and passed to a machine language routine. The following is an example of how a string variable is passed to the machine language routine:

```
60 PHRASE$="HELLO, HOW ARE YOU?"
70 X$=USR1(PHRASE$)
```

The phrase will be automatically sounded through your monitor speaker. Each phrase is limited to 240 characters; however, by using subscripted variables long messages can be developed.

A supplied dictionary is an important part of *The Translator* text-to-speech system. A set of "manager" programs are supplied to enable the creation of your own dictionary or to edit those which are supplied. Words may be added or deleted to an existing dictionary or a dictionary can be built from scratch. Words contained in a dictionary can be either listed on the screen or on a printer. This listing consists of each word within a selectable range (by alphabet) followed by the Hex values of the phonemes that are pronounced.

I found The Voice and its accompanying software an enjoyable introduction to the processes of computer speech synthesis. This is the only speech synthesizer I have used for the Color Computer and, therefore, cannot make any comparisons to other speech synthesizer systems. When using the editor, words were quite understandable as long as the right succession of phonemes were used. *The Translator* greatly simplified and facilitated the production of sentences, but the flow of speech was not always as smooth as normal speech, nor were natural inflections sounded.

Of special note is that a number of programs which make use of the capabilities of The Voice and *The Translator* are available. Of these are *Termtalk* (a talking terminal program), *Esther* (a talking psychoanalyst), a number of educational programs and some games. I advise you to take a look at the Speech Systems advertisements in order to gain a better idea of the wide variety of programs which are available for The Voice.

(Speech Systems, 38W255 Deerpath Road, Batavia, IL 60510, tape and disk $79.95)

— Larry Konecky

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INTBASIC, developed by WASATCHWARE, features all standard Basic command words including two-dimensional arrays, multiple commands per line and strings. In addition, INTBASIC offers commands that are not available with Color or Extended Color Basic. All 64k of RAM can be used for program storage and/or variable storage, and all 32k of ROM can be accessed within the m.l. program. Compiled programs can be called from a Basic program, thus making interfacing easy.

INTBASIC has many features that some of the lower priced Basic Compilers can't offer. Here are just some of them:
-No Disk system is required, although it can run from disk
-Extended Color Basic is NOT required
-Enables the full 64k of RAM to be used
-16k machines can run INTBASIC

In addition, INTBASIC is written in Machine language, not Basic. This means that compile times are very short. How short? INTBASIC can compile a 10 thousand byte Machine Language program in as little as 30 seconds!

Some other reasons to buy INTBASIC

-By converting Basic programs to machine language, program execution times are decreased by a factor of 50!

-Machine Language programs can perform many things that a Basic program cannot do. Unlimited possibilities exist when using machine language.

-Variable storage is efficiently allocated, and therefore large arrays may be used. For example, the integer array A(30000) is allowable on 64k machines.

-More than one program can reside in memory at once. As apposed to Basic which only allows one program at a time in the computer.

-System utility software can be easily developed using INTBASIC.

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Everyone's Guide To BASIC — A Supplement To Your CoCo?

Consumer Guide Publications has produced some fine materials for the consumer. Unfortunately, *Everyone's Guide to BASIC* is not one of their finer works of literature. The intended audience is a person who already has purchased a home computer. The book is also structured for almost all the computers that are currently on the market. This fact, coupled with the scant 80 pages of information, provides a very weak effort in instruction.

The book is divided into seven chapters:

The Basics of BASIC
Arithmetic Operations
Input/Output Operations
Loops and Variables
Control Operations
Library Operations
Some Sample Programs

My major criticism is not the topics covered in the book but the content in the topic areas. Since this book was written for use with most home computers, the individual subtleties of the machines cannot be adequately investigated. The topics covered are contained in any user guide that is included with the computer that was purchased. A supplemental book should be geared to a particular machine. Its generality does not allow for individual differences in machines. The price is very low but I'm afraid this is reflected in the quality of the presentation.

In summary, the book does not contain any information adjunctive to any properly produced owner's manual (especially the CoCo's). Also, the programs offered in the back of the book would not inspire a person who has read the user's manual. It also has a picture of another brand of computer on the cover. In short, *Everyone's Guide to BASIC* is best left on the shelf.

(Consumer Guide Publications International, Ltd., 3841 W. Oakton St., Skokie, IL, $4.98)

— Rick Cobello

Hint . . .

What To Do With Overlays

If you have a new keyboard (or one of the upgrade keyboards on the market), and you are using a program like *Scripsit* or *Platinum Worksaver* that uses a keyboard overlay, you can glue a piece of paper on the back of the overlay and mark the openings to indicate which key is which. You can then prop it against the keyboard and read the markings while you program.

Ed Donovan
Worchester, MA

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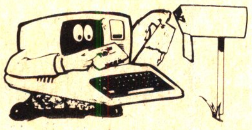

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VIP Database
A Very Interesting Program

By Frank J. Esser

Anyone who has been following the software that has become available for the Color Computer over the last year cannot help but notice the definite change in quality. Programs have gotten more sophisticated, more functional and just plain better quality. In other words they seem to offer the user much more function per dollar spent. There are now a number of database manager programs available. Some are average, some are good and others are very good. This review is about one of those database managers, or programs — the *VIP Database* from Softlaw Corp.

VIP Database is a true database manager in that it will set up the database to your format and handle the input and output functions for you. That is essentially what you want from a database program. The idea behind a database is to store information in a format which will make it easy to retrieve and either list, examine or modify. *VIP Database* not only performs all these functions, it is also very easy to set up and use. It has some areas where one must be careful until you have gained experience and are more at ease with its operation. But in general I found *VIP Database* to be a program of excellent quality and perhaps one of the best database programs I have seen for the Color Computer to date. It is easy to use, the screens are well done and easy to follow.

The input definition form is a bit tricky but once mastered, presents very little problems. The output form is extremely easy to follow and works very well. I had the database up and running within 20 minutes after reading the manual. Now I have 10 years experience with large database programs and systems, thus a lot of what I read I could relate to immediately. For the newcomer, do not be discouraged, the documentation is sufficient and easy enough to follow that it will guide you through those first few trial applications. The documentation is complete and well laid out.

The *VIP Database* comes on a 5¼" diskette which is not copy protected. Thus, it can be backed up using the standard RS *BACKUP* command. The documentation comes in a three-ring 7½" x 9" loose leaf binder. The *VIP Database* comes with a full one-year limited warranty for the program and media it is recorded on. The disk actually contains two database programs. One is for a 32K Color Computer called *DB32*. The second, called *DATABASE*, is for a 64K computer. Either of the programs is started by issuing the *LOADM DATABASE* for the 64K computer or *LOADM DB32* for the 32K computer. The program will auto-start once it is loaded, thus that is all you need do. Once up and running, you are presented with a main menu on a 51x24 character screen. As will be explained a little further on, you have a series of options that can alter that format. More on that later.

The manual is well written and easy to follow. Those who have experience with databases may find it to be a bit too basic. I found myself jumping over sections to find the information I needed. Only to come back later to review the skipped material to be sure I did not miss anything. But for those of you who are just starting out or have limited experience in this area, I think the manual does an excellent job. The manual is broken down into two sections and each section consists of several chapters.

Before I actually begin there is one item I want to mention. The manual has what I feel is one confusing point. It, the manual, consistently refers to a file in the context I would refer to a record within a file. Once I got over that hurdle, everything went quite smoothly.

The manual is broken down according to the following sections.

I. Creating Your Database
  1) Introduction
  2) Creating a file form
  3) Creating a database

II. Using Your Database
  1) Maintaining a database
  2) Using the math package
  3) Adding a file
  4) Displaying or editing a file
  5) Update form, copy and remove files
  6) Retrieving your information
  7) Sorting or unsorting files
  8) Printing your information
  9) Mailmerge and personalized form letters

III. Appendices
  1) Storage capacities
  2) Using a multi-drive database
  3) What to do if your TV screen is hard to read
  4) Other VIP programs

Let's look at each of these sections individually. The introduction is just that. It is a chapter devoted to telling you what a database is and what you should expect from it. Examples are given of different types of information that can be stored in the database. It will lead you through getting your thoughts organized such that you will have a,

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Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs which will be useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary, explaining how the program works. We're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a SASE to: Submissions Editor, THE RAINBOW, P.O. Box 209, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

perhaps, better idea of how you will want to store information in your database. The minimum requirements are a disk system with at least 32K of memory and one drive. *VIP Database* will run on a Color Computer series D through F, a CoCo 2 or TDP-100. To obtain full utilization of the database, a full 64K of memory is needed and at least one more disk drive, although the second drive is not as necessary as the 64K. Once up and running, the following menu is presented.

```
 * * * VIP Database * * *
  C Create database
  M Maintain database
  Q Quit

 Selection: -
```

Entering a 'C' will get the following menu:

```
 * * * Create Database * * *
  E Edit form
  C Create database
  F File directory
  V Verify diskette
  R Rename form
  K Kill form
  D Screen default menu
  Q Quit

 Selection: -
```

Selecting 'F' will display the disk directory of the selected drive. You will be prompted with:

```
 Select drive number (0-3): -
```

Entering a number will get the directory list for that drive. Selecting 'R' will allow you to rename files. You will be asked for the name of the file you wish to change. Once it is entered, you will be asked if you are sure this is the file you wish to rename. If the response is yes, then you are prompted for the new name for that file. You can abort this process at any point by pressing the BREAK key. As a matter of fact, I found that all processes, including the print function can be aborted by using the BREAK key — a very handy feature. Also, all keystrokes are followed by an audible key click. Thus, you can be sure that your data has been entered without constantly watching the screen. Selecting 'K' will allow you to kill or delete a file from a disk. Again, as in the rename file command, you are prompted with "Are You Sure" before the command is executed. Selecting 'Q' will get you back to the main menu. Selecting 'D' will cause the following menu to be displayed:

```
* * * Screen Default Menu * * *
  L  Light background
  D  Dark background
  G  Green screen
  W  White screen
  5  Screen width 51
  6  Screen width 64 wide
  7  Screen width 64 narrow
  8  Screen width 85
  Q  Quit

 Selection: -
```

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The choices I think are self-explanatory. The 'Q' selection will get you back to the Create database menu. Once the screen parameters are set they need not be set again unless the program is reloaded from disk. Selecting 'V' will allow you to verify the format of a given disk. In other words, can all the sectors still be read on the diskette? Upon entering this option you will be asked "Verify diskette in which drive (0-3)?" This option allows you to head off trouble before it becomes serious. I consider this to be an excellent feature. Selecting 'E' will put you into the input form editor. It is here that you will define just what the input form will look like, what items will be stored in your database, the name of each item, if any, and the length of that item.

The editor is a full-screen editor in that it allows you to wander anywhere on the defined editing area of the screen in any direction at any time. Positioning the cursor is accomplished by using the four arrow keys. Setting the cursor to a given position, a field can be defined and given a name if so desired. The default fill characters can also be set at this time. Now just what are default fill characters? During the time you are entering data, the default fill characters will indicate to you, on the screen, just what fields need to be filled in and the maximum length of each.

The top of the editor screen displays the current row and column of the cursor position and also the current page. The editor will allow for the design of an input form with a maximum of 10 pages, each page consisting of 17 rows. Thus the maximum of 170 rows is provided for. You can jump back and forth between different pages by using the SHIFT Up Arrow and the SHIFT Down Arrow. The bottom of the editor screen is devoted to showing the options available with the editor in its present mode of operation. Should you hit the BREAK key a new set of options is displayed.

Once the form layout is complete, you can exit the editor with the option to save the form. The form generation must be complete before the actual database can be generated. The reason for this is quite simple. The input form is used to define the items and their length that will be stored in the actual database. And since the cart before the horse does not function very well, you must define the input form first. Selecting 'C' will allow you to create the file in which your data will be stored. You will be prompted with the following message:

Select drive for database (0-3): -

You will then be asked:

Beginning file number? -

The *VIP Database* keeps track of your data by numbers. If you choose '1' as the response to the above prompt, then the first record entered into your database will be number one, the second number two and so on. They will be entered in sequence beginning with the number entered above. Once that is complete you will be asked:

Current name: dbform.dfm:0
Form name?

Enter the name of the form you have just created using the editor. Completion of this step causes the following prompt to appear:

Current Name: database.dat:0
Database name?

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If you wish to use the default name of *database.dat:0* then just press the ENTER key in response to the current name request. If you would like a different name, enter it after the database name request and it will become the default name. If you have not exceeded the limit, your database file will be created for you. If you have exceeded the maximum limit an error message will be displayed and the file will not be created. You then must go back to the editor and trim your requests. By the way, the editor does have an option which will allow you to determine the requirements without leaving the editor. Thus, you can check whether the form you have defined is too large or not before exiting the editor. If the database file is completed you are done and ready to enter data.

Entry of data into the database is covered in the section titled "Maintaining A Database." Going back to the main menu, we have three choices: create a database, maintain a database and quit. The previous section looks at what is required to build the data entry screens and the actual database. Entering 'M' on the main menu will clear the screen and the following message will appear:

Select drive for database (0-3): -

Enter the drive number into which your data disk is loaded. The following menu will then appear.

* * * Maintain Database * * *

A - Add file
E - Edit, search or display file
D - Screen default menu
U - Update form
F - File directory
P - Print menu
S - Sort and Unsort files
C - Copy file
M - Math form edit
Q - Quit

Selection: -

First file: 1
Next file:

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The "Add File" section is the method used to enter data into the database. Upon entering an 'A' you will get the screen you built before in the "Create A Database" section. Across the top of the screen you are informed of the row, column, page, file number and item number of the present cursor position. Across the bottom of the screen you are informed that:

SHIFT @ - will restore all items
BREAK - save data on screen and quit
SHIFT CLEAR - restore an item
CLEAR - to calculate all items

The left- and right-arrow keys will move you through the fields on the screen. You can enter a data field, skip over it or backspace to a previous field and reenter it. The only areas open for data entry are those areas you defined as being data fields. The rest of the screen is off limits in that you cannot move the cursor into any of these areas. The SHIFT @ key will clear the screen of all entered items and return it to a blank form. The BREAK key will ask you "save form (Yes or No)?" Answer yes and the form is saved, answer no and you are returned to the Maintain Database menu.

If you answered yes to the save form prompt, after the data is saved you are asked "Add another (Yes or No)?" If you have more data to enter, then answer yes and the entire process can be repeated. Answer no and it is back to the Maintain Database menu. Select 'E' on the main menu to display the file. Again you will see the screen form you used for data entry. However, now there is data entered in the fields. Across the top of the screen is displayed the file number that holds the data you now see on the screen. Across the bottom of the screen you will see the following prompts:

'E'dit 'H'ard copy 'S'earch 'N'ext 'P'revious forward back
'F'irst 'L'ast 'D'elete 'I'gnore case 'R'ecognize case 'G'oto
'Q'uit

I think these options are self-explanatory. The hardcopy can be made either to printer or to a disk file if so desired. Using the search option allows you to search through the database using almost any combination as a match. Entering an 'S' from the edit screen form will get a clear form. Enter in the item to be searched; i.e., the value you wish to search on. Pressing the BREAK key will get the following prompt:

'V'alue or 'L'abel

If the field is a value, that is numeric, then the entry would be 'V' otherwise it would be 'L'. You will then be asked for the relational operator, which can be EQ, NE, GT, GE, LT, or LE. After that entry you will be asked "AND, OR or END." If you wish to expand your search to more than one item you can select to either "OR" or "AND" the results. If you are finally done and ready to perform the search function then enter 'E'. The database will then be searched until the first file satisfying the search parameters is found. If one is not found you are informed that the entire file was searched and no matches occurred. If a match was found, the file is displayed for you. To continue the search function press 'N' and the program will look for the next occurrence. When the end of the database has been reached the number of matches will be displayed. The search function is very powerful and the almost unlimited use of the relational operators makes complex searches very easy.

Selecting 'D' from the main menu will get the following menu on the screen.

```
* * * Screen Default Menu * * *
   L Light background
   D Dark background
   G Green screen
   W White screen
   5 Screen width 51
   6 Screen width 64 wide
   7 Screen width 64 narrow
   8 Screen width 85
   Q Quit

   Selection: -
```

Again I think these options are self-explanatory.

Selecting 'F' from the main menu will ask you for the drive number and will then list the directory of the disk in that drive.

Selecting 'P' from the main menu will get you into the print options. From the submenu you can set the printer defaults of Baud rate, CR/LF after each line, word length, page length, page pause and line delay. The *VIP Database* is set up to work with almost any printer and this section allows you to select the print parameters needed with your printer. Once that is complete you can set up a print form in much the same manner as the screen form was built. Thus you will have the ability to see just what the printed form will look like without all the usual trial runs to the printer. You can also list the file attributes to the printer from this menu. You can rename a print form or kill a print form as well. There is a mail-merge option where, when working with *VIP Writer*, one can construct form letters using the data records in the database to fill the blanks in the form letter.

Selecting 'S' from the main menu will allow you to sort the entire database according to an ascending or descending order by a single item only. Once the file is sorted it can be printed or displayed. The file can be placed back into its original order by using the "Unsort" function.

Selecting 'C' from the main menu will allow you to delete or copy files. If you delete a file, you are asked "are you sure" before the file is deleted. To copy a file you need first create a blank file and then copy the desired file into it.

Selecting 'M' from the main menu will get you into the math package. The math package gives the user the ability to describe a math relationship between fields. In other words, the value entered in one field could be a different field times a constant or perhaps times the value of yet another field. The standard math operators are supported, those being '+', '–', '*', and '/'. Thus '22 = 0.5 * 33 means the value of item 22 equals the value of item 33 times the constant 0.5. The math package will also evaluate formulas contained within parentheses.

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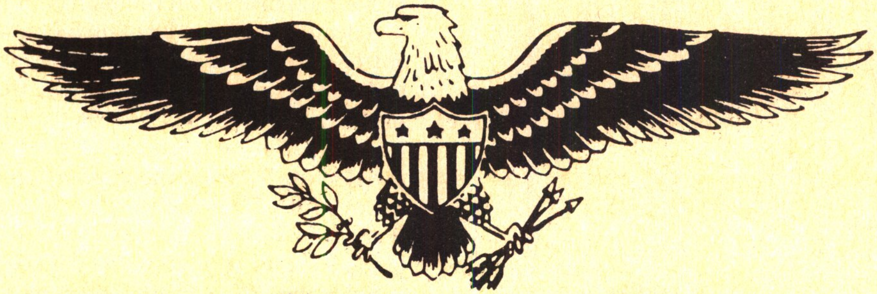

Color Micro Journal

The Color Computer Monthly Magazine **$1.95 per issue Vol. 1, Issue 2 October, 1983**

THIS 'N THAT

The **BIG NEWS** this month is that **OS-9** has finally arrived for the Color Computer. The **ASTOUNDING** part of the Radio Shack OS-9 Package, besides the price, is the **DOCUMENTATION**. You 'Old Time Radio Shack Followers' will not believe what you see. Jon Shirley has been telling us that the main reason for the "lack" of documentation with a lot of their products was the restrictions placed on releasing that information by **Microsoft**; I

OS-9 on the COLOR COMPUTER

One of the "Operating Systems of the Future" is **now available** for the "little old Color Computer"; **OS-9**. Freely translated, OS-9 means "Operating System for the 6809" (OS-9 is now being written for the **68000**, also). Since it is fairly obvious that UNIX and "UNIX-Type" Operating Systems will be running on just about every computer to come out in the next few years, a whole new language is beginning to appear on the horizon.

Color Computer OS-9; the Package

We had been running a preliminary release of OS-9 on the Color Computer for a few weeks, and received the "Official Radio Shack" version for Review a couple of days ago. To put it mildly, this package is **IMPRESSIVE!** For $69.95 (Radio Shack Catalog Number **26-3030**), you receive a 9 1/2" x 7 5/8" x 2" package containing 4

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We have now covered the entire operation of the database, from the creation of the database screen, to the creating of the database file, through the entry of data into it and the methods or operations that can be performed once the data has been entered. The entire operation is smooth and very easy to use. I would strongly suggest that one create a couple of sample databases and goes through the entire spectrum before beginning any serious applications. Thus you will obtain a better feel for just what the *VIP Database* can do for you. I think it is a program of very good quality. It has excellent menus that cover all conditions and that have present at all times the options open at that particular time. There is no need to search through the manual to find the right option. The screens are very easy to build and are of first-run quality when finished. The math function and the search function are extremely powerful and useful functions but yet are very easy to learn to use. I feel that this is perhaps one of the finest database programs for the CoCo that I have seen to date.

The 64K version comes with its own mini-disk operating system, thus the standard ROM based routines are not entirely used, if at all. The database will support the different size databases depending upon the amount of the memory available and the number of disk drives on line. With a 64K machine and four disk drives, the *VIP Database* would support a file of 2,394 records. The database uses record sizes of 255 bytes minimum. This means that if the sum of the lengths of the fields you choose is less than 255 bytes, the difference will be wasted in the sense that it will not be used.

If you are using disk drives that have head select relays, the disk drives will sound like a machine gun when the database is being accessed. It appears that the disk is accessed and then released immediately following the completion of the operation. Thus the relay chatters. It does absolutely no harm to the drive since the heads have to be strapped to load with drive select. I have mentioned it here so that you will not be concerned with it if and when it happens.

The sort function seemed to take an abnormally long time to complete. I sorted a database of 219 records on a field that was 20 characters long. The entire sort took a little over 30 minutes to complete. Why so long I don't know. I could not find any options that would speed it up. But then again, how many times does one really sort such a database.

There are a couple of items I would like to offer as possible enhancements for future revisions. I think it would be nice to be able to define printer formats that would allow for the full 132 columns available on most printers using compressed print. Also, that the screen and printer default parameters somehow be saved so that one is not forced each time to reenter them. Other than those few items I really liked *VIP Database*. Again, as I have said through this review, the program is very well done and very easy to master.

The menus are excellent in both their content and quality. The data entry is both smooth and fast. The only real slow item was the sort function. I really like the *VIP Database* and find it an excellent addition to the ever growing list of excellent programs available for the CoCo at very reasonable prices.

(Softlaw Corp., 9072 Lyndale Ave. So., Minneapolis, MN 55420, $59.95 plus $3 S/H)

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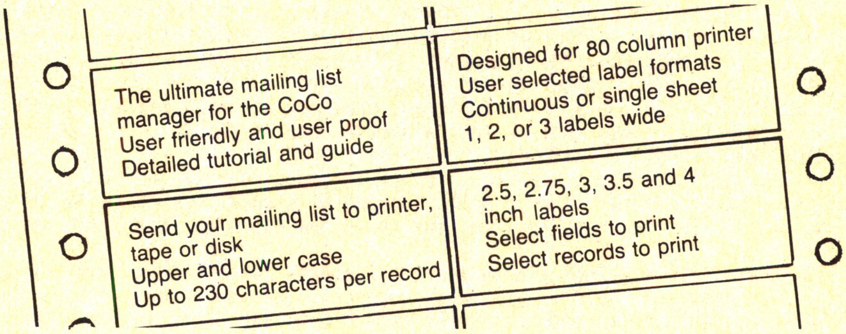

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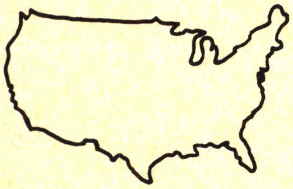

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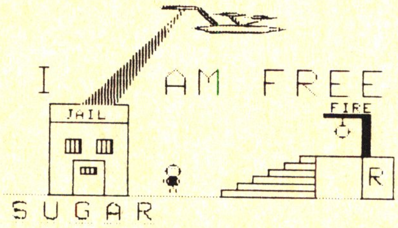

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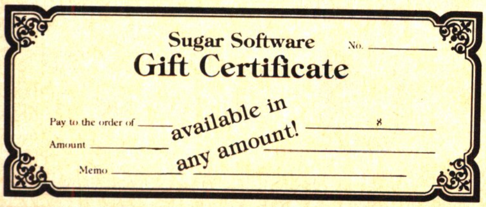

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Froggie Really Keeps You Hopping

Watch out for that car! Look out for that truck! Beware of diving turtles and grabbing otters!

Well, in case you haven't guessed, I'm playing *Froggie*, a clone of that popular arcade game "Frogger." And a very good version of the game, too! If you aren't familiar with how to play this game, here is a description. You must successfully navigate your frog across a five-lane highway, avoiding all the trucks and cars, and then you must guide him across a river — jumping on logs, turtles and crocodiles, and finally end up in one of the empty "homes" at the top of the screen. If you succeed in filling all five homes, you proceed to the next screen. You can get bonus points on your journey by landing on lady frogs or flies. However, at higher screen numbers you will be killed for touching snakes, otters or crocodiles in your home area.

The documentation that comes with the game gives all the information required to load and play the game. However, there is one minor error in it. The instructions say that when the game has finished loading, "the screen becomes completely *blue* or *red*, press the Reset button until the screen is completely *blue*." But in fact, the screen that comes up is black with only the word "FROGGIE" which must be changed to blue.

When the game starts, you have four spare frogs to replace the ones that get killed. You also get one bonus frog for each 10,000 points scored. The number left is indicated by small frogs in the lower left-hand corner of the screen. You have approximately 30 seconds to get the frog safely home. The time remaining is indicated by the length of a bar in the bottom right-hand corner of the screen. This bar starts out blue, but turns red as a warning that you have only a few seconds before your time is up. When the game ends, you will be able to enter your initials if your score is high enough, and since when the game is loaded, scores from 10,000 to 50,000 are already there, you may have to work hard to make the top of the list.

The game may be played either with joysticks or using the keyboard arrows. As explained in the instructions, when using the joysticks, it is necessary to make sure that you point the stick "very close" to the up, down, left or right positions, or there's no telling which way you will end up jumping. After some practice I was able to use the joystick reasonably well, but I still prefer to use the arrows with this game.

The graphics and sound effects in *Froggie* are reasonably good — but not great. The thing that I like best about this game is the speed at which you can move. As soon as you press an arrow or the fire button, there is no hesitation and the frog jumps, so that you can very quickly maneuver your way up the screen.

In my opinion, this is an excellent game and I would not hesitate to say that it would be a welcome addition to any game lover's library.

(Spectral Associates, 3418 South 90th St., Tacoma, WA 98409, cassette $24.95, disk $28.95)

— Brian Dawson

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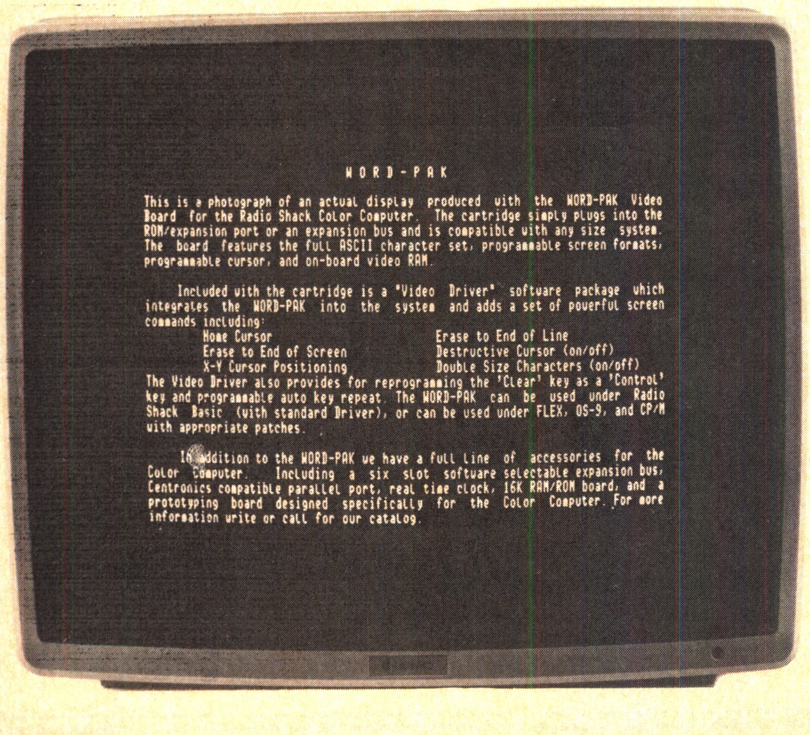

```
                          W O R D - P A K

This is a photograph of an actual display  produced  with  the  WORD-PAK  Video
Board  for the Radio Shack Color Computer.  The cartridge simply plugs into the
ROM/expansion port or an expansion bus and is compatible with any size  system.
The  board  features the full ASCII character set, programmable screen formats,
programmable cursor, and on-board video RAM.

     Included with the cartridge is a "Video  Driver"  software  package  which
integrates  the  WORD-PAK  into  the  system  and adds a set of powerful screen
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        Home Cursor                        Erase to End of Line
        Erase to End of Screen             Destructive Cursor (on/off)
        X-Y Cursor Positioning             Double Size Characters (on/off)
The Video Driver also provides for reprogramming the 'Clear' key as a 'Control'
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E-Z Base: Just What It Says

I never had much luck with database programs. Radio Shack's *In-Memory Information Program* on the Model I did nothing for me. I never figured out how to use *dBase II*, and I'm just beginning to understand *DataStar*. When I heard that I was to review *E-Z Base*, I thought (since I heard the name and didn't see the spelling) that it was some kind of utility program for BASIC. When I saw that it was a database program, I thought I would have one rough weekend reviewing it, and when someone told me that I wouldn't even need the manual I didn't really believe it. But I was wrong; I was able to make *E-Z Base* work right from the start, and hardly looked at the manual.

E-Z Base is designed to run on a 32K CoCo with one disk. From the looks of it, I'd say that one drive is all you need; the entire program stays in RAM at all times, and the *E-Z Base* disk can be pulled out and a data disk inserted in drive 0. The first thing it does when you run the BASIC program is to load a machine-language, Hi-Res text driver, which provides a first-rate, 42-column, 20-line screen. This comes up as black characters on a green background; you can switch to black on buff with three keystrokes, which would give you a better display on a black-and-white TV or monochrome monitor. The driver also has a full upper- and lowercase character set; you can make entries in lowercase if you like, but all the one-key selections (and there are quite a few) in the course of the program must be capital letters, and if you search for a word it must be spelled exactly as it is in the file (and with the same case) or it won't match.

The program's simplicity is due partly to the fact that it doesn't have a whole lot of functions available. *E-Z Base* does let you define the number of fields, enter data, edit data and fields, sort by a field, print data, search the file for a keyword, and (in the case of numeric data) take averages in each field.

An example of the program's use is a file I created of video equipment suppliers. There are six fields (brand, parent company, VCR format, VCR manufacturer, videodisc format and disc player manufacturer). Here's what a sample record from that file looks like:

Brand: RCA
Parent: RCA Corp.
VCR Format: VHS (1977-)
VCR OEM: Matsushita (1977-1984), Hitachi (1979-)
Disc Format: CED (1981-1984)
Disc OEM: RCA

In this file I can search for brand names, parent companies, manufacturers and formats. If I search for "RCA" in the field "Disc OEM," I would come up with all the brands whose videodisc players were made by RCA (JCPenney, RCA, Sears and Zenith). If I search for "Matsushita" in the field "VCR OEM," I would get all the brands that have had video recorders made by Matsushita; if I instead searched in the "Parent" field, I'd get Matsushita's own TV brands (Panasonic and Quasar). A search for a word will turn up all references to that word in the desired field, even if it occurs in a different phrase from what you intended; if I search the file for "Sanyo," I would not only find references to Sanyo but to Tokyo Sanyo, a separate division.

To get output from the program, you can either use the printer option to send the file contents to the printer or run another program called *WORD/BAS* that takes any *E-Z Base* data file and generates an ASCII file containing the same information. This lets you merge data into a document in a word processor.

Sorting can be done by field in ascending or descending order. Because the entire program is in BASIC (the ML routine is strictly for Hi-Res text), the sorting function is very slow; another file with four fields and 29 records took almost six minutes to sort! Since sorting is automatic (you don't have to sit there answering Y, N or whatever on each iteration), this isn't as bad as it seems. If you have a really big file (the limit is 15 fields and 500 records), you could start the sort going and go off to do something else while it's cranking away.

The analyze function averages numeric values in fields and provides a report. I didn't try this thoroughly, since my time was limited and I didn't have a sample numeric file to try it on.

The manual does go into a good bit of detail about how to use the program, and anyone who can figure out how to start up the computer and insert the disk into the drive should have no trouble with the program.

If you need a simple database program, one that doesn't need a manual, *E-Z Base* is it.

(Spectrum Projects, 93-15 86th Drive, Woodhaven, NY 11421 or 4285 Payne Ave. #9866, San Jose, CA 95117, $24.95 plus $3 S/H)

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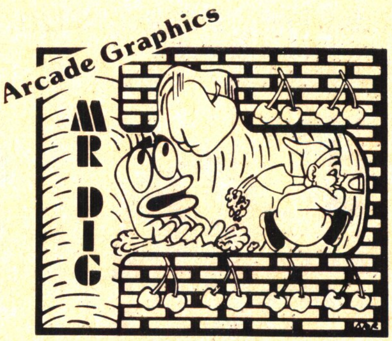

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Tut's Tomb Is A Captivating Arcade Quest

Tut's Tomb is a great new graphic arcade game from Mark Data. The game is modeled after the arcade machine with a similar name.

The Hi-Res graphics in *Tut's Tomb* are as good as any ever done on the CoCo, and make the most of the rather limited *PMODE4* graphics by using artifact colors skillfully and working around the 6847 video chip's quirks. Everything is done against a buff background instead of black, which gets rid of the "black square syndrome" so often seen on the CoCo. Character movement is just as smooth as on computers featuring "sprite graphics," even though the character shapes have to be redrawn every time they are moved. The sound quality matches the picture in every way; the tunes played in *Tut's Tomb* sound more like music and less like the squeaks and squawks of a video game. (The background noise is due to the simple digital-to-analog converter used for all sound generation on the CoCo.)

While loading the cassette version of *Tut's Tomb*, a nice Lo-Res color "loading page" appears. It's nice having something to look at when loading the cassette, other than the blinking 'F'. After the game has loaded, it displays its own Hi-Res title page, which consists of your little adventurer walking out to the middle of the screen, having the monsters appear on both sides of him and then listening to a very good version of the theme from "Raiders of the Lost Ark." Press the fire button on the right joystick to start the game.

Your quest is through 16 chambers of an Egyptian-type tomb. Simply go through these chambers and pick up treasures along the way. This may sound very simple, but there are a lot of things complicating your quest. There are snakes, bats, vultures, and whirling curses, all of which are deadly to the touch.

In every four chambers there is a big door that must be opened with a key. And just for those who thought this would be pretty easy, there is a timer adding pressure on you. When it runs out, your gun no longer fires, but the timer restarts when you go through a big door. Like the arcade version, you can only fire right and left — no up and down shots allowed. Now that you have this overwhelming force opposing you, you could use a little help, like a flash bomb that destroys all monsters in that chamber. Also you can use, because of emergency or necessity, a teleporter set in each room. Each chamber actually has four teleporters, two for monsters and two for you. There is just one other slight complication: before every big door, and occasionally in other chambers, there are locks that require a key to open. To make the key situation a little worse, you can only carry one key at a time. One thing about using the flash bomb that the instruction sheet doesn't mention is that it seems after you use it, the monsters speed up a little. If you do somehow complete all the chambers, you will start over in chamber one, but the monsters move a lot faster.

The instruction sheet is very good, but it never mentions how to use the flash bomb (only that you get another one after every big door). The flash bomb is used by hitting the Space Bar on the keyboard, which I discovered by wildly smashing the keyboard in panic. Another problem is that your adventurer is so responsive that it takes a little getting used to handling him. The biggest complaint I have is that the monsters don't have to actually touch you to kill you, they can just get very close to you.

Tut's Tomb is well done. The sounds that go along with the play are also very good. The joystick responds well to your movements. This game is a must for anyone with any kind of game library at all.

(Mark Data Products, 24001 Alicia Pkwy., #207, Mission Viejo, CA 92691, $24.95 cassette, $27.95 disk, 32K required)

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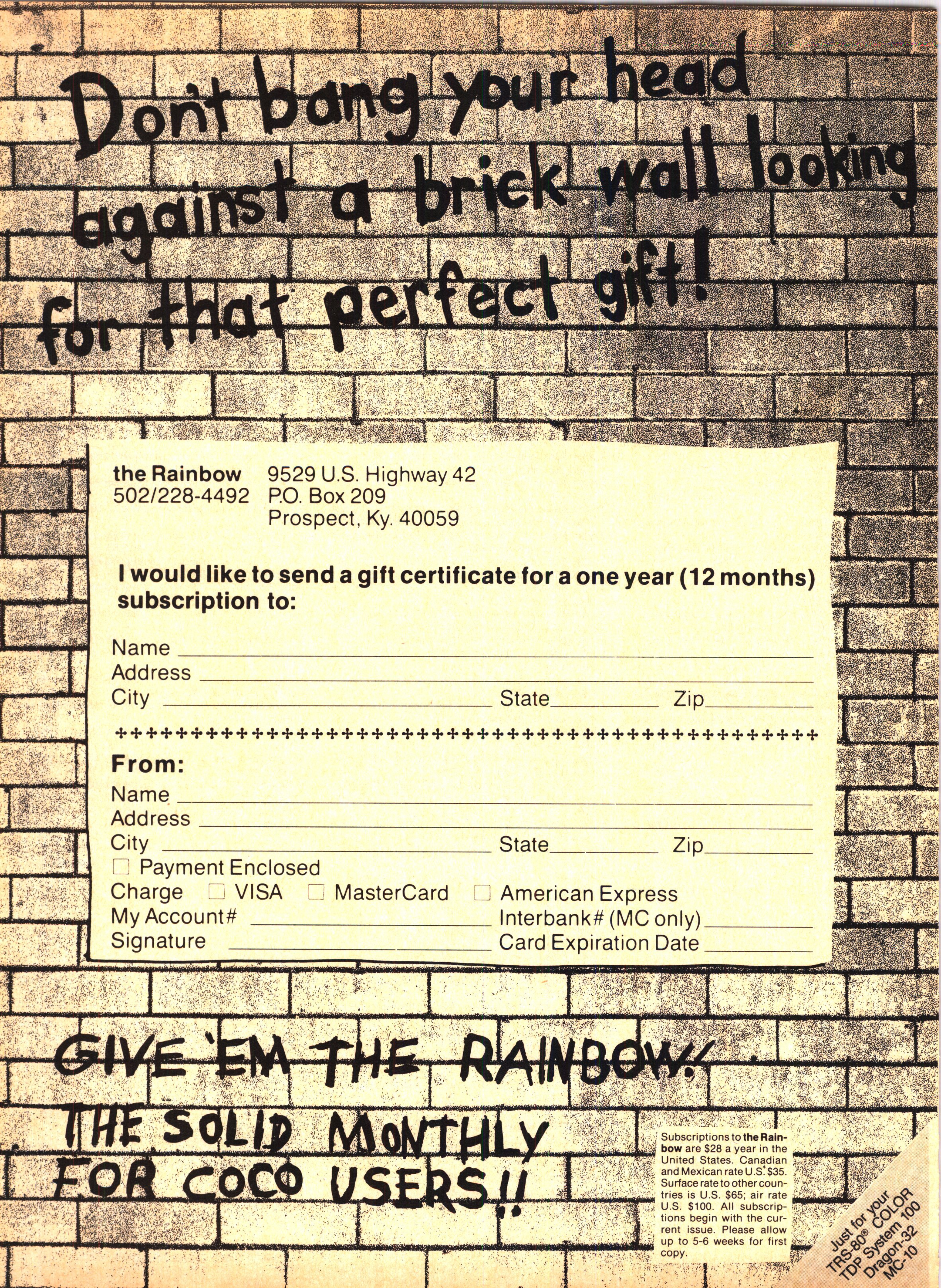
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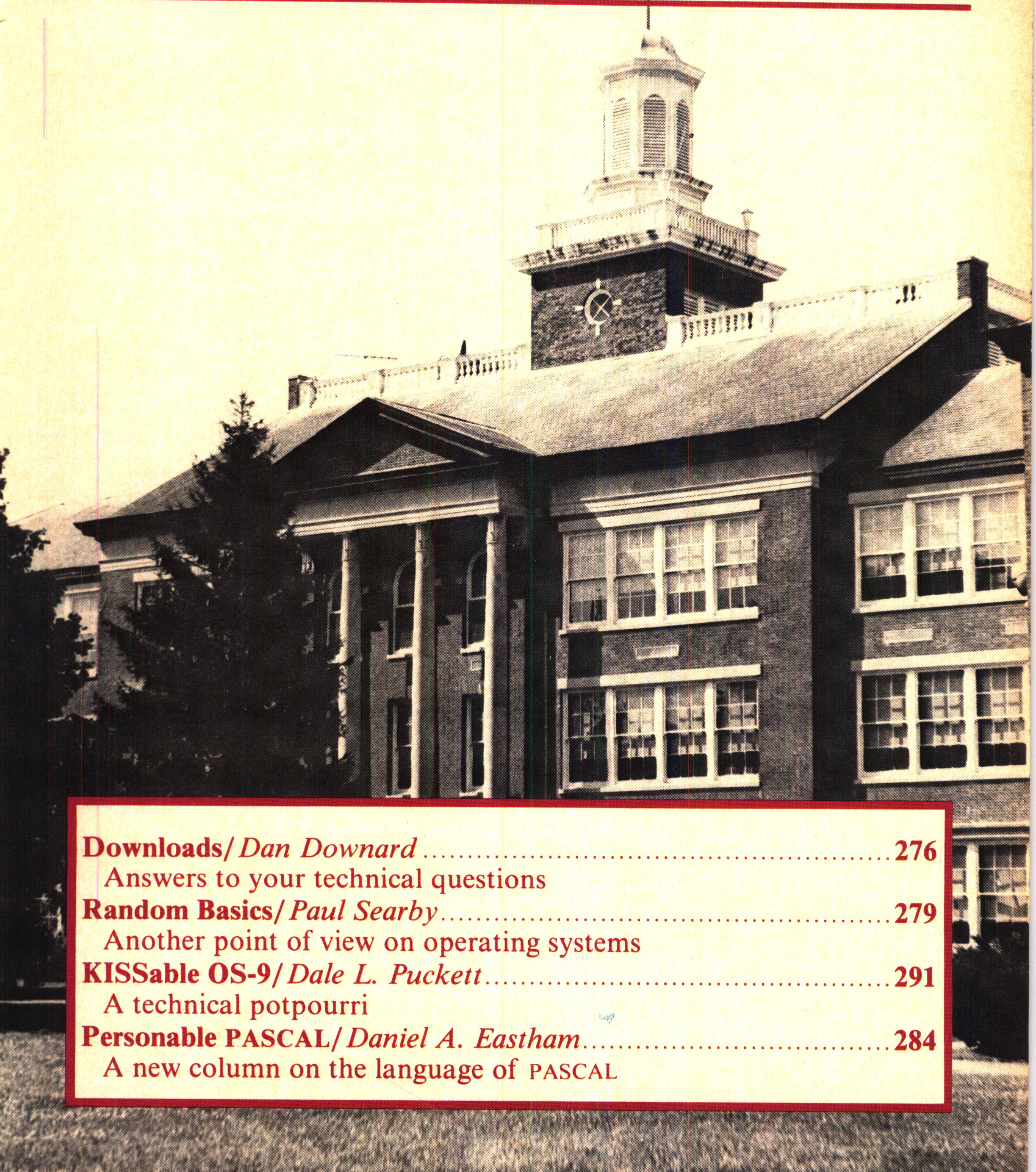

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Thanks For 'Getting Started' . . . Now Let's Continue!

By Dan Downard
RAINBOW Contributing Editor

• *Thank you for your "Getting Started With Machine Language" article in the January '84 issue, it was very informative. However I do have a problem. Like many readers of* THE RAINBOW, *I do not have an editor/assembler. Thus, I tried to use the short program described in Method 3. Hence the problem: After typing in and entering the starting address (&H----) I am fine until I come to Line 140 of the listing below. After entering the four-digit response I get a ?SN Error!*

```
3203 ED   8D 0043   00120   STD    MAX,PCR
3207 2F   3B        00130   BLE    NODATA
3209 10AE 8D 003C   00140   LDY    MAX,PCR
```

Where am I going wrong? Also, can you explain:

1) *What is "$"?*
2) *What is "&"?*
3) *What is "op code"?*
4) *What is the appearance difference between a machine and assembly language listing?*
5) *Am I correct to* CSAVEM"FILE NAME", START ADDRESS, END ADDRESS, START ADDRESS *when* CSAVEing *using Method 3?*

I appreciate your patience with a novice programmer.

Jerry Crabtree
Catlettsburg, KY

As Rosanne Rosannadanna would say "Jerry, you boys from Kentucky sure ask a lot of questions!" On the other hand, if you didn't, I wouldn't have a column. Let's take them one at a time.

Every byte in memory can be represented by two hexadecimal numbers. Remember a byte is eight bits of zeros and ones. That's 256 possible combinations. By using two hexadecimal numbers between 0 and F you can represent any byte. All you are doing with the program you mentioned is *POKEing* successive memory locations with a byte of machine code, sometimes called an "op-code." Since you can only input one byte into any address, only two numbers can be input at a time. Otherwise 10AE would have to be input as 10, and then AE.

1) "$" is the representation for Hex, as opposed to decimal, in assembly code.

2) "&" (usually along with "H") is the representation for Hex in BASIC.

3) "Op-code" is the actual machine code in RAM.

4) The only listings you see in THE RAINBOW are assembly language. The purpose of an assembler is to generate machine language (op-codes) from assembly text.

5) The third address you mention is not really a start address, but an *EXEC* address. This is the point that the actual program execution begins. It may be different from the start address.

Good luck, Jerry. The only way to learn is by asking questions and experimentation.

High-Speed POKE

• *How does the fast* POKE *work? I recently purchased a CoCo 2 and am a subscriber to* THE RAINBOW. *I have seen many articles which mention* POKE 65495,0 *and have found it does speed up program execution time. My question is, if 65495 is located in ROM, why should a* POKE *to that location make any difference? In addition, after* POKE 65495,0, *I make a* PEEK (65495) *and the value has not changed!*

By the way, your column is very informative and professionally done. Keep up the good work!

Eliot Weinman
Brookline, MA

As a matter of record, Eliot, I do not recommend using the high-speed *POKE* in programs. The same results can usually be accomplished by more efficient programming.

The fast speed *POKE* is actually accomplished by setting a register in the SAM chip at addresses 65494 and 65495. This register determines the division of the master clock frequency before it reaches the microprocessor chip. Since the master clock frequency of the CoCo is 14.31818 MHz, if you divide by 16 the result is .895 MHz, or the normal operating frequency. If you divide by eight, you get 1.8 MHz, or the speed that is used for the high-speed *POKE*.

The reason you can *POKE* these addresses is that they are registers within the SAM chip for setting various memory and mode parameters. *POKE*ing even addresses clears the registers, and odd addresses sets the registers. They are write only registers, hence, you will get nothing if you *PEEK* them. For a full explanation of

(Dan Downard is an electrical engineer and has been involved in electronics for 24 years through ham radio [K4KWT]. His interest in computers began about five years ago and he has built several 68XX systems.)

their functions obtain a copy of the *TRS-80 Color Computer Technical Reference Manual*, Cat. No. 26-3193, from your local dealer.

Map Finders

- *A colleague and I are in dire need of an extremely good subroutine map, from BASIC statements to* LINE *and* DRAW *statements, for both standard Color BASIC and Extended Color BASIC ROMs.*

Jody Threet
Checotah, OK

Jody, I would recommend *Color BASIC Unraveled, Extended BASIC Unraveled,* and *Disk BASIC Unraveled* from Spectral Associates in Tacoma, Wash. They are $19.95 each, or all three for $49.95, and well worth the investment for your purpose. Other than that, I can also recommend the memory map that appeared recently in THE RAINBOW, or disassembling BASIC yourself!

Basically, No Address

- *Please explain the use of addresses EOOO-FEFF. Are they used now for anything? Can SAM address these addresses directly or do some chips have to be added for decoding?*

Charles C. Worstell
Auburn, WA

Addresses $D800 to $FEFF are not used by BASIC, Charles. You can use them for anything you like as long as you are in the 64K mode and have BASIC in RAM. As long as you are in Map Type 1, the SAM chip recognizes 64K of RAM. As soon as you hit *RESET*, though, you go back to 32K of RAM and 32K of ROM, or Map Type 0. Assuming you have already copied BASIC to RAM, all you have to do to re-enter the 64K RAM Map is *POKE& HFFDF,0*.

Purchasing Parts

- *I am planning to purchase disk drives for my 64K ECB CoCo II. However, I don't plan to buy a complete system. I'm going to buy parts separately.*

I plan to purchase a J&M Disk Controller with Disk Extended BASIC, drive 1 (less disk controller), and the cable to connect the controller and the drive. Can I buy drive 1, the controller and cable, and hook all of them to assimilate a drive 0 system? Where can I get the cable? What is the address of Radio Shack National Parts?

This is going to cost more than a drive 0 system through mail order, but I don't want to purchase a drive 0 system and a J&M controller separately. I want the gold contacts that are standard with the J&M controller.

Brian S. Graham
Cleveland, TN

If you are going to buy a J&M controller, Brian, I would buy a drive from them also. You will get 40 tracks instead of 35 and six ms. track-to-track access. Of course only 35 tracks are available using Radio Shack Extended Disk BASIC.

Along the lines of your question, the cable you are referring to is normally supplied with the controller. The part number of the cable is 8709205.

I know of no special address other than National Parts, Radio Shack, Tandy Center, Fort Worth, Texas 76102.

If you indeed buy a Radio Shack drive 1 and use it for drive 0, you will need a termination resistor, RA2. It can be ordered as manufactured part no. ECM00-13500.

Mounting A Remote Reset

- *I've wanted to install a switch for Reset on the front of my CoCo, alongside my reverse video switch that I put in for John Skora's reverse modification. On Page 64 of the technical manual, in the upper-left corner, there is a Reset switch diagram. This looks to be nothing more than a simple contact set.*

The one thing I am concerned about is the model number of the computer described in the manual. I can't find any indication whether this is an "F" board. I have an "F" board, 32K ECB.

John C. Burke
San Francisco, CA

It really doesn't make any difference which CoCo you have, John. The Reset switch on the rear of your CoCo is nothing more than your description, a simple contact set. Mounting a remote Reset on the front of your computer should not present any problems. This switch actually grounds the Reset line on your 6809E, and other LSI chips, through a diode. On the "F" board the set of terminals nearest the keyboard are the two used for the Reset contacts.

Making The Upgrade

- *I have an "E" board 4164 RAM chips, a drive 0 with* 40K *and* Print Spooler.

After performing the upgrade, I've found:

A) 40K *and* Print Spooler *lock up the CoCo.*

B) Diagnostic ROMPAC indicates 32K RAM.

C) Your "ROMRAM" program (March '84, Page 289) and FFDF POKE *lock up the CoCo with drive 0 hooked up, but work fine in Extended BASIC.*

D) Bob Rosen indicates (Sept. '82, Page 59) that other modifications are necessary to access the 64K, namely:

1) Pin 5 (ground) of 74LS138 to pin 4 of the unused gate (74LS02)

2) Pin 6 of that gate to pin 8

3) Pin 5 of that gate to test point 1

I assume all of the above 5 pins must be removed from the socket and bent upward. My questions are:

A) If my above assumption is correct, how does the 74LS138 maintain its ground return path?

B) What effect does removing Pin 8 of the existing gate have on the RAM address line between the SAM chip and decoder?

C) Will the above modifications actually give me 64K capability by software access?

D) Do I bend the pins upward?

Gary Curto
San Rafael, CA

Gary, your 64K chips are not enabled until you make the upgrade you mention. There are two problems with your description of the modification.

Pin 8 of the 74LS02 does not get bent upwards. The connection to this pin has to be tack-soldered.

Pin 5 of the 74LS138 is not the ground, but the G2A chip enable input. The ground on a 74LS138 is Pin 8.

The reason you bend the pins upward is that if they were sideways they would touch the shield. I put a piece of tape between these pins and the case, just in case.

For a summary of all upgrades see "RAM/ROM Upgrade Roundup" by Ed Ellers in May '84 RAINBOW.

As soon as you make the modifications all the programs you mentioned should work without a hitch.

Getting What You Pay For

- *I would like to purchase a 64K Upgrade kit that costs only $19.95.*

Would that be as good as buying one that costs $99? Would my computer be as good as a brand new 64K machine?

Donald Nolan
N. Royalton, OH

Donald, I would be suspicious of a 64K upgrade kit that costs only $19.95. If you purchase eight 4164 chips and install them yourself your computer will be just like the ones you buy. The minimum price we have seen for these chips is around $40. I wouldn't recommend any that sell for less. You get what you pay for!

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RANDOM BASICS

Operating Systems — Another Point Of View

By Paul Searby
RAINBOW Contributing Editor

This month's article is a departure from my series on Design and Development of Application Software, and will cover some *unbiased* points of view on the different operating systems available for the Color Computer. I must admit that it was prompted by Frank Hogg's article in the May issue of THE RAINBOW, since I plan on addressing a number of the statements that he made. I can honestly say that my opinions are unbiased, since Computerware® has roughly an equal number of products on both FLEX (TSC) and OS-9 (Microware and Motorola), and thus don't have any particular reason to promote one over the other. As to background, we've been in the business before either operating system was developed, and in fact, we contributed significantly to the development of the operating system that FLEX was patterned after, Smoke Signal DOS.

Before we even get into a discussion of FLEX versus OS-9, I think it's quite relevant to ask the question: Why use either one? If you look at the ads in the magazines, you can find virtually any product that you might want available for the CoCo under its native operating system Disk Extended BASIC. I had to use Disk Extended BASIC in my comparison because neither FLEX nor OS-9 support cassette. So when we start talking expense, let's take them all into consideration. Just could be that $30 or even another $60 for additional software is just a drop in the bucket compared with the startup "dues" that you have to pay to join the alternate operating system club.

Back to the why again. From all the people that I've talked to on the issue of other operating systems, I get the feeling that even though there are a number of reasons, a prevailing one is that they *want to learn* more. For many, a home computer is a personal extension course on one of the most fascinating subjects we will ever have an opportunity to learn about in our lifetimes. When we use phrases like "user friendly" in conjunction with computer operating systems, we are either kidding ourselves or are talking about the Macintosh. There is plenty of user-friendly software available for the CoCo, but it is in the form of application software, not operating systems. If you don't know any operating system at all, is FLEX really that much easier to learn than OS-9? At least, if you want to make a duplicate disk on OS-9, you do it essentially the same way you did with Disk Extended BASIC. FLEX does not even have a *BACKUP* command. Since a fair amount of the software that is offered on FLEX is the more serious software, needing to be backed up by the user, the absence of a *BACKUP* command in FLEX is a very serious deficiency. True, you can use the *COPY* command to get the backup, but FLEX disk I/O is so slow, and now to avoid having even slower non-contiguous files, you must re-format the diskette even before you can get started.

I could go on picking on FLEX, but that's not the purpose of this article. The point I was just trying to make is that you can pick either one of the operating systems apart if you get to define your own standards. Each has strengths and weaknesses. If it is true that *learning* is an important part of going to a different operating system, then I think the time spent learning OS-9 is much better invested than that of learning

(Paul Searby has been involved with computers and data processing since 1969, working primarily on larger IBM systems until 1975 when he bought, built and programmed the first "personal computer" ever made — an Altair 8800, which came in kit form with 1K of memory. In 1977 he left a position as project manager for a large corporation to devote his full efforts to his company, Computerware.)

FLEX. The design of FLEX is out of date, where OS-9 is patterned after current operating system theory. Although OS-9 doesn't follow UNIX (Bell Labs) exactly, the concepts are there and odds are that your next computer (or the one at work) will also be either running another UNIX look alike or UNIX itself. (It may also be easier to understand filament tube technology, but you'd find learning about integrated circuits more useful.)

An opinion that Frank and I do not differ on is that the initial implementation of OS-9 on the CoCo is second rate at best. Even though I'm sure some of the blame rests with Tandy, I would be inclined to place more blame on Microware since they developed and supposedly debugged it. However this does give Dale Puckett plenty of material for his well presented column! I should also point out that initially both the original FLEX and Frank's adaptation had a number of "bugs" which took time to get ironed out. One of the really nice things about OS-9 is that due to its modular structure, it is easy to update or add new features. Computerware also offers a true double-sided, all-tracks, any-step-rate driver for OS-9 which corrects the deficiencies found in Tandy's. In addition, our package includes a *DIRCOPY* command that solves the multiple files copy problem. True, it's not free, but just as *O-Pack* is reasonably priced, so is our *Disk Fix and Utilities* package.

As to the memory issue, several points need to be made. First, it is not necessarily a requirement that you use a Hi-Res display for everything you do, and if you take out the space used by a Hi-Res display, you have almost 43K left to use. By the microcomputer standards that I'm used to, this is a pretty healthy chunk of space. Even if you include a Hi-Res display, there still is ample space to run most serious applications, including all of our business software. I won't deny that there have been times that I wished I had more memory under CoCo OS-9, but if I'm honest with you, I need to add that I've also made that same wish on every computer that I've worked on. You could give programmers several megabytes of memory, and at some point in time they would be back wanting more!

The last point of Frank's that I will specifically address is the one of cost. I noticed that FHL has added a "tiny editor" and assembler to their FLEX package, allowing him to make his comparison appear to be somewhat accurate. However, they were not included when most of us purchased FLEX during the last two years, and since they are not full-fledged versions, I do not feel that what you get with OS-9 and FLEX are truly comparable. I feel that this is again a situation of defining the standard to try and make your side appear preferable. In actuality, to get reasonably comparable packages, you need to add another $70 to the FLEX price for FHL's full Editor and Assembler (or our Editor and Assembler Combo for $65), which brings the price of each to roughly $135-$140. Same basic price, same basic features.

As I mentioned earlier, since you had to spend around $500 or more for memory and a disk system to use either FLEX or OS-9, it's not clear that a final decision should be made based on a relatively small dollar difference anyway. More important items would include such things as the level of support that will be offered, the availability of products, etc. Since Radio Shack is offering OS-9, it will be more widely used, and thus, this gives a larger base of potential customers. This means more support from outside vendors. Ultimately, this translates into more products and competitive pricing. In the past, products on OS-9 have been more expensive, but that was attributable to the small base of SS-50 users. With thousands of copies being sold by Radio Shack, it won't take long for prices to come down and more products to be developed.

In summary, I'm going to go back to my original question: why buy either one? If you can't answer this question, then save your money. If the purchase is to be made so that you can use some specific software product that only operates on one of the alternate operating systems, then your decision is already made for you. If you are one of the remaining who wants to expand his or her understanding of computers, in the long run you will benefit more from OS-9. Whatever decision you make, remember this: With most of the other inexpensive personal computers available, you wouldn't even get the opportunity to make a decision. The CoCo is probably the most flexible inexpensive computer made!

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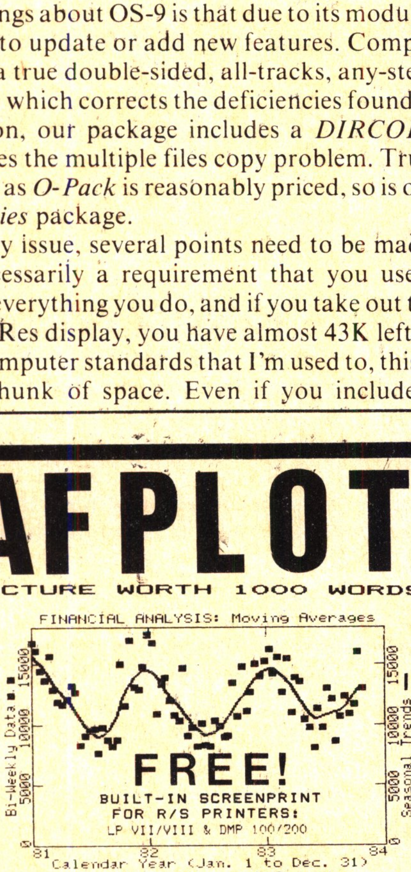

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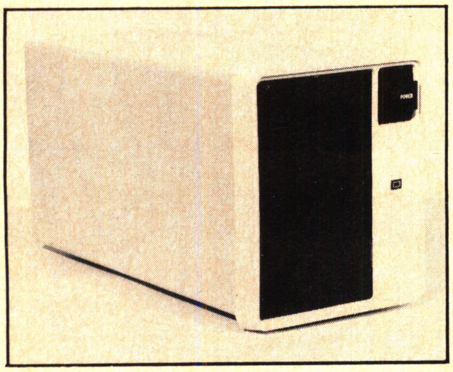

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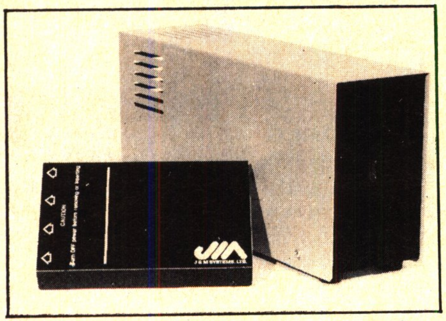

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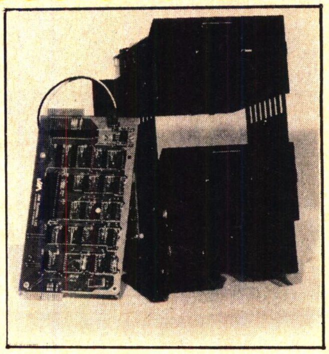

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PERSONABLE PASCAL

Welcome To PASCAL

By Daniel Adams Eastham
RAINBOW Contributing Editor

As most of us already know, BASIC is not the only programming language available on the Color Computer. The 6809 assembly language is used by many programmers and has several advantages over BASIC. However, assembly language is inherently harder to learn and a program written in assembly language requires significantly more code and debugging than the same program written in BASIC.

Although these are the prevalent languages being used on the Color Computer, DEFT Systems, Microware Systems Corporation and Technical Systems Consultants (TSC) offer a third language called PASCAL. In addition, a subset of PASCAL is offered by Computerware. This series of articles will discuss programming in PASCAL using the *DEFT PASCAL Compiler*. It is implemented as a PASCAL to 6809 machine language compiler that includes several language extensions.

What Is PASCAL?

PASCAL is a high-level programming language which is relatively independent of any given hardware architecture. Like BASIC, PASCAL lets you manipulate real numbers, strings and arrays by using assignment, *IF, GOTO, FOR* and input/output statements. However, PASCAL also contains a number of features not found in BASIC:

1) Statements do not have line numbers and don't have to be contained on a single line.
2) Variables can have 12 character names.
3) Data can be grouped not only into *ARRAYs*, but also into *RECORDs* and *SETs*.
4) You can define your own types of data and give these data types names. This concept is not present in BASIC or assembly language and will be covered in full in later articles.
5) You can define *PROCEDUREs* and *FUNCTIONs* and give them names.
6) You can pass parameters to *PROCEDUREs* and *FUNCTIONs*.
7) You can define "local" variables as well as *CONSTants, TYPEs, PROCEDUREs* and *FUNCTIONs* inside *PROCEDUREs* and *FUNCTIONs*.
8) *WHILE* and *REPEAT* statements allow you to do any type of loop without having to use a *GOTO* (you *can* use *GOTOs* if you really want).
9) The *CASE* statement allows you to test for any of multiple possible values.
10) Variables can be allocated and deallocated as necessary during program execution.

The one thing you cannot do in PASCAL is to directly enter a statement and have it execute. This limitation is imposed because you have to run the PASCAL compiler in order to convert your PASCAL source code into 6809 machine language code. By doing this compile step, you get a program that executes at almost the speed of assembly language.

The PASCAL Program

Like BASIC, a PASCAL program is made up of a series of statements that are executed in sequence to perform some function. In addition to these *executable* statements, PASCAL also has *DECLARATION* and *STRUCTURE* statements.

(Daniel Adams Eastham holds a B.S. degree in computer science and has 13 years experience in systems and communications programming, including work on the original Telenet packet switching network. He is the author of the DEFT PASCAL Workbench and is currently president of DEFT Systems, Inc.)

Declaring Variables

Declaration statements are special statements that tell the compiler things about the program but which perform no action. For example, in BASIC the *DIM* statement tells the interpreter how many dimensions an array has and how many elements are in each dimension. In PASCAL, you use a *VAR* statement to declare an *ARRAY*. In fact, all variables (even those that are not *ARRAYs*) must be declared before you can use them.

For example:

```
  VAR Amount: REAL;
        MyInitial: CHAR;
        Name, Address: STRING;
        Count: INTEGER;
```

This *VAR* statement declares *Amount* to be a *REAL* number, *MyInitial* to be a *CHAR*, *Name* and *Address* as *STRINGs* and *Count* to be an *INTEGER*. A colon separates the list of identifiers being declared from the *TYPE* that they are being declared as. A semicolon must be used to separate one declaration from another.

A real number in PASCAL is about the same as a number in BASIC. The main difference is that it is stored internally as decimal digits rather than as a binary number. This means that .9 + .1 will always add up to exactly 1.

An integer in PASCAL is a whole number in the range of -32768 to +32767. Use of integers where possible allows the compiler to generate very efficient code. There are several statements in the PASCAL language where integers are allowed and real numbers are not.

A *CHAR* in PASCAL is a single ASCII character. A string is a variable number of *CHARs*. It is very similar to a string in BASIC and can be up to 255 characters long.

You will notice that both upper- and lowercase letters can be used interchangably in order to improve readability. The compiler treats both upper- and lowercase letters as uppercase. For the examples in these articles, I will be using all uppercase for PASCAL reserved words and predefined identifiers, and upper- / lowercase for identifiers that I define in the examples.

Why Declare Variables

In BASIC, the interpreter knows what kind of data a variable represents by the variable name's spelling. If it ends in a dollar sign, then it contains an ASCII character string, otherwise, it contains a real number. FORTRAN has a similar convention for distinguishing between integers and reals. PASCAL, on the other hand, has many additional kinds of data and even allows you to mix several different kinds of them in a single variable! If we tried to use a naming convention like FORTRAN's or BASIC's, things would start getting pretty complicated. By always declaring the variables, you can specify both the name that you want to use as well as the kind of data that it represents.

Many PASCAL compilers also allow you to specify attributes of variables such as automatic or static allocation. These attributes are declared as part of the *VAR* statement. The upcoming articles on *PASCAL TYPEs* will introduce you to the many ways that you can represent data and a following one on separate compilation will talk about the attributes that you can give data.

Program Structure

Structure statements are used to divide a program into sections. For example, all PASCAL programs contain at least the following structure:

```
    PROGRAM [program name];
      [declaration statements]
    BEGIN
      [executable statements]
    END
```

The *PROGRAM*, *BEGIN* and *END* are structure statements that divide the declaration statements from the executable statements. In addition to these, the declaration statements used to define *PROCEDUREs* and *FUNCTIONs* are also structure statements that separate the corresponding subroutine from the enclosing routine.

"In BASIC, the interpreter knows what kind of data a variable represents by the variable name's spelling. If it ends in a dollar sign, then it contains an ASCII character string, otherwise, it contains a real number."

Some BASIC Statements

Now that we know what the fundamental program structure looks like and how to declare some variables, all we need are some executable statements. Like BASIC, PASCAL has an assignment statement. However, it looks a little different from BASIC's:

```
    Amount := Amount + 5;
```

The assignment symbol is actually the two-character combination :=. The expression on the right-hand side is evaluated and the result is stored into the variable on the left-hand side.

PASCAL also has an *IF* statement that allows you to test a condition and then take one of two courses of action. For example:

```
    IF Count = 3 THEN AMOUNT := Amount + 5
                    ELSE Amount := Amount -4;
    IF MyInitial = 'A' THEN Amount := 4;
```

As you can see, it is not necessary to include the *ELSE* portion of an *IF* statement. In the second statement we have compared a *CHAR* variable with a *CHAR* constant. PASCAL uses single quotes rather than double quotes to delimit *CHAR* and string constants.

A *FOR* statement allows you to construct a loop very much like the *FOR* statement in BASIC. The main differences are that there is no *STEP* option but you can go either up (by specifying *TO*) or down (by specifying *DOWNTO*). For example:

```
    FOR Count := 1 TO 10 DO Amount := Amount + 4;
    FOR MyInitial:='D' DOWNTO 'A' DO Count := Count
      -3;
```

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Package	**$99.90**

Requires O-Pak.

O-Pak

O-Pak is a three part utility package. It is designed to enhance the OS-9 Operating System of the TRS-80 Color Computer.

O-Pak consists of HIRES, CSEdit, and four "X" commands. HIRES provides a higher resolution screen display than the standard 32 by 16 characters supplied by Radio Shack. CSEdit is the character set editor designed to make modification of your character sets simple and fun.

If you wish to transfer some data files from a disk BASIC or FLEX-formatted disk to an OS-9 disk, the four "X" commands will assist you.

RS OS-9 **$34.95**

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A portable p-code implementation of a PASCAL subset which includes the control structures of standard PASCAL and supports the data types INTEGER, CHAR, BOOLEAN, scalar (enumerated), subrange, pointer, and ARRAY, along with the dynamic memory management functions NEW, MARK, and RELEASE. Dynasoft PASCAL is COMPLETE. It includes a fast one-pass compiler, a p-code interpreter, a supervisor program and program SAVE, and LOAD routines.

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The statement following the *DO* is executed once for each value of the loop counter. In the second example you see that you can also use a *CHAR* variable in a *FOR* loop. However, PASCAL does not let you use a real number as the loop counter of a *FOR* loop. The next article will describe how to execute multiple statements as the result of an *IF* or *FOR* statement.

In order to input a variable from the keyboard you use a *READLN* statement:

```
READLN (Amount);
```

In order to print a number on the screen you would use a *WRITE* or *WRITELN* statement:

```
WRITELN ('The answer is: ', Amount);
```

The *WRITE* and *WRITELN* statements are exactly the same except that the *WRITELN* statement always finishes by outputting a carriage return and *WRITE* does not. A common use of the *WRITE* statement (for screen I/O) is to provide a prompt before doing a *READLN*.

Semicolons

You notice that I have included a semicolon at the end of all the example statements. In PASCAL, the semicolon separates one statement from another. This may seem like an unnecessary complication but it allows you to use more than one line to make a statement. For example:

```
WRITELN ('My name is ', Name,
              'and my address is ', Address);
```

The compiler knows that the statement continues on to the second line because there is no semicolon on the first line. Of course, like BASIC, you can also put multiple statements on a single line and separate them with semicolons.

In general, we will put a semicolon at the end of each statement. The only current exception to this is in the *IF* statement where there is *no* semicolon following the *THEN* statement when the *ELSE* is used. As we discuss the language in future articles, you will begin to see some subtleties in the use of semicolons. For now, we will generally put one at the end of each statement.

Example Program

This is a very simple program that computes the sum of all the numbers in some range. It first prompts you for the numbers on each end of the range. You can either enter the lower or higher number first. It then prints the sum of all the numbers in that range.

The first two lines are a comment. Like statements, comments can extend across multiple lines. When the compiler sees a (* combination outside of a character string, it takes all the following characters as a comment until it sees a *) combination.

The *VAR* statement declares both the input variables first and second as well as the result variable sum and the loop counter number. The executable portion of the program uses all the statements that were introduced above. The *IF* statement is used to determine whether the lower or higher number was entered first and the *FOR* statements compute the sum.

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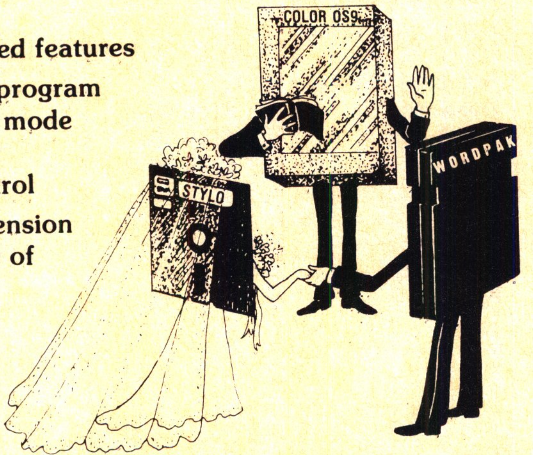

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```
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 00 0000       (* This is a comment. It starts with the ‘(*’
 00 0000         and can extend across lines. It ends with the  *)
 00 0000
 00 0000       (* This program computes the sum of all the *)
 00 0000       (* integers in a specified range             *)
 00 0000
 00 0000       PROGRAM SumOfNumbers;
 00 0000
 00 0000       VAR First, Second, Sum, Number : INTEGER;
 00 0000
 00 0000       BEGIN
 01 0006         WRITE (‘FIRST NUMBER: ’);
 01 0025         READLN (First);
 01 0036         WRITE (‘SECOND NUMBER: ’);
 01 0056         READLN (Second);
 01 0067
 01 0067         SUM := 0;
 01 006B         IF FIRST < Second
 01 006D           THEN FOR Number := First TO Second DO Sum := Sum + Number
 01 008B           ELSE FOR Number := First DOWNTO Second DO Sum := Sum +Number;
 01 00C7
 01 00C7         WRITELN;   (* this skips a line on the screen *)
 01 00CF         WRITELN (‘SUM: ’, Sum);
 01 00F2
 01 00F2       END.




SYMBOL       CLASS       STRUCT ALLOC  DATA TYPE    VALUE   LOW   HIGH   SIZE


FIRST        VARIABLE         DYNAMIC  INTEGER         -6  -32768  32767     2
NUMBER       VARIABLE         DYNAMIC  INTEGER        -12  -32768  32767     2
SECOND       VARIABLE         DYNAMIC  INTEGER         -8  -32768  32767     2
SUM          VARIABLE         DYNAMIC  INTEGER        -10  -32768  32767     2

STACK REQUIREMENTS:    16


CODE SIZE           246
UNUSED STACK       7831
MAX SYMBOLS          69
TOTAL ERRORS          0
SOURCE FILE:  INTRO:1
OBJECT FILE:
```

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KISSABLE OS-9

Designing Your Own Procedure Files

By Dale L. Puckett
RAINBOW Contributing Editor

Wow what a weekend! The New Brunswick RAINBOWfest is history now, but I still haven't recovered. I hear that more than 10,000 people were on hand and I'll believe it. For a while, it seemed like everyone was trying to get into the same room for the BASIC09 seminar. In fact, the seminar went so well that I agreed to do two at the RAINBOWfest in Chicago, June 22-24. We'll talk about OS-9 itself Saturday. Sunday we'll tour BASIC09 again.

The interest in OS-9 at New Brunswick was amazing. Radio Shack sold hundreds of copies of our favorite operating system. A number of visitors also purchased BASIC09 and Microware's new C compiler.

Your commitment to OS-9 inspired me to invest in additional CoCo hardware so that I will be able to evaluate new products quicker. I bought a pair of the Shugart SA-455, double-sided, double-density disk drives which feature a six-millisecond stepping rate. I'll leave them plugged into my CoCo all the time, saving the hassle of unplugging my present five-inch drives from the Gimix every time I need to test a CoCo procedure.

I also purchased the C-C BUS from PBJ, Inc. and a Keytronics Keyboard at New Brunswick. The C-C BUS will let me stay abreast of the many hardware improvements just around the corner for CoCo OS-9 users. In fact, I'm already using PBJ's *Word-Pak* and their new *PC-Pak*. We'll take a detailed look at *PC-Pak* this month and as soon as Ed Bender finishes the software, we'll preview PBJ's new dual RS-232 cartridge for you.

The new keyboard will let me get a better feel for OS-9 word processing software on the Color Computer. There's a lot of exciting action on that front. Serious users can now pick between *Advanced Editor*, a line-oriented editor from Computerware; and three screen-oriented word processing systems: *DynaStar* with *DynaForm* and *DynaSpell* from Frank Hogg Labs [See Dan Downard's review of these FHL products in the review section.]; *Elite*Word*, from Elite Software; and *Stylograph* from Great Plains Computer Company.

I have used *DynaStar* for the past three years and used the original *Stylograph* several years before *DynaStar* arrived. I have just received a copy of *Elite* Word* for OS-9 and am busy testing it. A copy of the CoCo *Stylograph* system is on the way from Idaho Falls now. An interesting point about *Stylograph* is the fact that Great Plains supplied it with a routine to set it up for the Hi-Res screen from FHL's *O-Pak* or PBJ's 80 x 25 video cartridge. You can name your poison. I hope other software suppliers will follow this lead.

We'll try to give you a preview of each word processor during the next few months, starting this month with a look at *Advanced Editor*. [See reviews section, elsewhere in this issue.] There just isn't enough time to do everything we want to get done.

More About Procedures

Sometimes this seems like an impossible mission. No matter how many details I give, I always seem to leave one out.

We received a letter from Dale Wheeler in Merkel, Texas, regarding one such omission. He was trying to follow the procedures we used in the April issue to show you how to free up disk space for BASIC09. He writes:

"The first procedure uses the 'del' command to delete files that are not

---

(Dale L. Puckett is a free-lance writer and programmer who has worked with the Motorola family of microprocessors since 1976. He just completed his first book, The Official BASIC09 Tour Guide, *this summer. It is being published by Microware and will be available this fall. He is the author of* DynaSpell, Readtest, Esther *and* Help, *which are available from Frank Hogg Laboratories. He serves on the Info World Software Review Board and is a Chief Warrant Officer in the U.S. Coast Guard.)*

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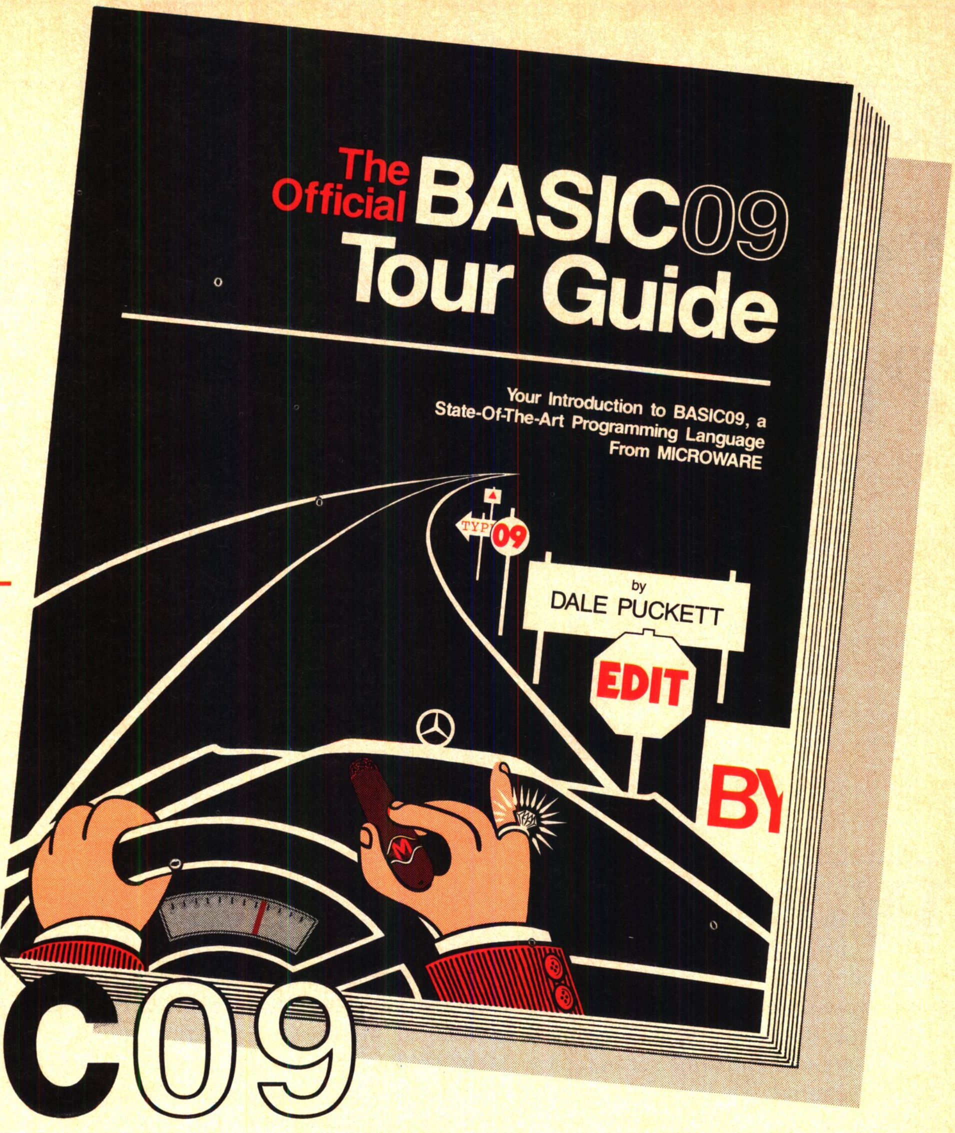
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needed. This command will not work at all. Regardless of what I use after the 'del' command, all I can get is an error #216. Deldir DEFS works okay, but that does not free up much space! Please give me a step by step procedure that I can use to get the maximum disk space for use with BASIC09."

First, let's highlight the problem. In April, I wrote:

> . . . Look at all the long programs you can delete. The list includes asm, backup, cmp, cobbler, debug, deldir, edit, format, ident, and os9gen to name a few. These command lines should do the job.

```
OS9: load del
OS9: del asm backup cmp cobbler
  debug
OS9: del format ident pwd pxd
OS9: del os9gen shell verify
OS9: unlink del
```

Those commands work. I used them. Can you figure out why they wouldn't work for Dale?

Here's the problem. I assumed that everyone knew that the "del" command worked on files in the current data directory. Dale's system was most likely set up with /d0 as the current data directory and /d0/CMDS as the current execution directory.

For the above sequence of commands to work, you must first make /d0/CMDS the current data directory. You would do it like this:

```
OS9: chd /d0/cmds
```

Once you have done this, I guarantee the list of commands above works. Here's something you can do when you receive a #216 (file not present) error. Type:

```
OS9: pxd ; pwd
```

If you run this command with a backup of your original system disk in drive /d0 after running the "chd" command above, your screen should look like this:

```
OS9: pxd ; pwd
/D0/CMDS
/D0/CMDS
```

PXD is telling you that /D0/CMDS is the current execution directory. Then PWD, since we ran it sequentially on the same command line by using the semicolon, reports that the /D0/CMDS is also the current data directory.

I hope this short review helps you find out what your trusty OS-9 system is trying to tell you when it gives you those sketchy error messages. When something doesn't work, don't be afraid to experiment. When you're learning a new operating system, imagine you're playing a new Adventure game and use the same strategies you would use in the *Colossal Cave* — just don't get too brave and join the Navy. And, experiment only after you have made a backup copy of your data or software.

In his letter, Dale Wheeler also asked for some help with the DSAVE command:

"The second procedure you outline, the building of a bootlist, works up until the dsave command. I cannot make heads or tales of this command. The command as you give it in the magazine article is obviously a guideline, and we must substitute filenames or something in the appropriate places to make it work. You must be assuming that the people who read your column are familiar enough with OS-9 to figure out what must be inserted where! Please have a little sympathy for us novices who are trying hard to get a hold on this operating system."

First, let me say that the procedure listed in April works. However, it seems a typo slipped into the column. It should read:

```
OS9: chd /d0
OS9: dsave -s20 /d0 ! (-x chd /d1)
```

Here's an alternate form that works just as well and may be easier to understand:

```
OS9: dsave -s20 /d0 /d1 ! shell
```

You may also find a few more tricks you can use with the dsave command in this column in the May RAINBOW.

Since letting the computer do all the work for you is the name of the game, and since procedures are the key to making it happen, we have prepared a tutorial this month to help you see how they work. Special thanks go to Ed Bender, who writes the software for PBJ's hardware, for giving us permission to share these procedures with you.

The procedures listed are designed to let you install a new CLOCK module, a PIA device driver and a device descriptor for a parallel printer to be called /p1 in your OS9boot file. The new drivers work with PBJ's *PC-Pak*. I used this procedure to install the *PC-Pak* on my CoCo so I know it works like a champ. In fact, I even edited it and used it to install the *WordPak* driver modules and

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new /TERM device descriptor at the same time. OS-9 is indeed versatile!

In an attempt to make a crystal clear blueprint of what happens when you run a procedure like "install.2" I made photocopies of the various directories used at different times during the execution of the procedure file. I did this by editing the procedure file so that the command lines which delete several files and directories after their use would not execute. This let me list them for you to study.

You can stop a line in one of your own procedure files from executing by inserting an asterisk, *, as the first position in the line. This lets you save the line for future reference, but doesn't let OS-9 execute it because the SHELL considers all text following an asterisk in this position to be a comment.

Let's look first at a directory listing of a backup of the original disk from PBJ and then a listing of a directory on that disk named MODULES.

```
        directory of /rs2        12:25:40
MODULES      bootlist     install.1     install.2

      directory of /rs2/modules        12:27:47
Clock          PIA          P1
```

Now, let's list the procedure file "install.2" and see what it asks OS-9 to do.

```
t
tmode .1 -pause
chd /d1/MODULES
load save
save CCIO CCIO
save TERM TERM
save CCDisk CCDisk
save D0 D0
save D1 D1
save D2 D2
save D3 D3
save P P
save PRINTER PRINTER
save RS232 RS232
save T1 T1
save IOMan IOMan
save SCF SCF
save RBF RBF
save SysGo SysGo
save Shell Shell
save PipeMan PipeMan
save Piper Piper
save Pipe Pipe
OS9gen /d1 </d1/bootlist
unlink save
*DELDIR /D1/MODULES
*d
*DEL /D1/BOOTLIST
chd /d0
dsave -s30 /d0 >/d1/makecopy
chd /d1
*/d1/makecopy
*DEL /D1/MAKECOPY
tmode .1 pause
-t
```

At this point you should have booted OS-9 from a backup of your original system disk and installed a backup of PBJ's *PC-Pak* drivers disk in drive /D1. You run the procedure file "install.2" by typing:

```
OS9: /D1/install.2
```

The procedure file first uses the "t" Shell command to ask OS-9 to echo all input lines to the standard output path. Then, it uses TMODE to tell the system not to pause after each screen when outputting to the present standard output path. Note that you must always use the ".1" — numeral one, not lowercase "L" with the TMODE command when you are issuing it from a procedure file.

Then, the file tells OS-9 to change the current data directory to the directory /D1/MODULES. At this point that file contains three files; CLOCK, PIA and P1.

Next, the author loads the command utility SAVE and uses it to save all modules presently in memory that he wants to put in his new OS9BOOT file. For example:

```
SAVE CCIO CCIO
```

This line tells OS-9 to save the module in memory named CCIO in a file named CCIO in the current data directory. In the line before, the procedure set the current data directory to /D1/MODULES so the full pathlist to the new file is actually /D1/MODULES/CCIO. Remember, when you run the SAVE command, the first parameter (name) is a pathlist to the file where you want to store the module(s) named on the rest of the line.

After saving all of the needed modules, our procedure file runs the command utility OS9GEN. It has redirected the input for OS9GEN from the standard input path to a file named /d1/bootlist. Let's look at that file now.

```
CCDisk
CCIO
D0
D1
D2
D3
P
PRINTER
PIA
```

```
P1
TERM
IOMAN
SCF
RBF
SysGo
Clock
Shell
RS232
T1
PipeMan
Piper
Pipe
```

If you study the list of names in the file "bootlist" and the list of modules saved in the files in the directory /d1/MODULES, you'll see that they are identical. In fact, files you name in your bootlist file *must* be available on a disk installed in your system or you will generate an error and your procedure will fail.

Looking at the description of OS9 GEN in the Radio Shack manuals, we learn that OS9GEN simply creates and links to a new OS9BOOT file made up of any number of modules stored in a list of files that it receives from the standard input path. We could have typed that list on the terminal. But, it's easier and safer to do as we did here, and give OS9GEN the list in a previously edited file.

After creating the new OS9BOOT file on the disk in /D1 — the same one that contains the procedure files and everything else we have been looking at — the procedure file unlinks the save command utility module in memory because it is no longer needed.

Then, it normally proceeds to delete the directory /d1/MODULES and the file /D1/bootlist since they are no longer needed. We used the asterisk to stop this line from executing so we could show you what they look like.

Note also that we put an asterisk before the "d" on the line following the DELDIR command. The "d" is an answer to DELDIR's prompt asking whether you want to list the directory, delete the directory or quit. Let's look now at a directory listing of the directory /D1/MODULES before it was used by the procedure.

```
 directory of /rs2/modules    12:34:24

Clock    PIA     P1      CCIO
TERM     CCDisk  D0      D1
D2       D3      P       PRINTER
RS232    T1      IOMan   SCF
RBF      SysGo   Shell   PipeMan
Piper    Pipe
```

Notice that all those SAVE command lines in the procedure file really worked. Now, take a look at a directory listing of the disk after the procedure file above was executed.

```
         directory of /rs2   12:34:06

MODULES     bootlist     install.1    OS9Boot
INSTALL.2   makecopy
```

When you compare this directory listing to the original listing you'll notice that there is an extra file on the disk now. OS9Boot has been stored on the disk and the OS-9 has linked to it. OS9Boot now contains the modules stored in each file listed in the file "bootlist" which were actually the files you saved into the directory /D1/MODULES.

After deleting the files in the module /D1 /MODULE, the directory itself and the file "bootlist" the procedure changes the current data directory to /D0. This drive should contain a backup of your original system disk.

Then, our trusty procedure file issues a command for OS-9 to run the DSAVE command utility and save the results in a file called "makecopy." It uses the -s30 option to tell OS-9 to use 30K of memory when it makes each copy. Let's see what DSAVE does by studying a listing of "makecopy."

```
t
tmode .1 -pause
load copy
Makdir CMDS
Chd CMDS
Copy #30K /d0/CMDS/asm asm
Copy #30K /d0/CMDS/attr attr
Copy #30K /d0/CMDS/backup
   backup
Copy #30K /d0/CMDS/binex binex
Copy #30K /d0/CMDS/build build
Copy #30K /d0/CMDS/cmp cmp
Copy #30K /d0/CMDS/cobbler
   cobbler
Copy #30K /d0/CMDS/copy copy
Copy #30K /d0/CMDS/date date
Copy #30K /d0/CMDS/dcheck
   dcheck
Copy #30K /d0/CMDS/debug
   debug
Copy #30K /d0/CMDS/del del
Copy #30K /d0/CMDS/deldir
   deldir
Copy #30K /d0/CMDS/dir dir
Copy #30K /d0/CMDS/display
   display
Copy #30K /d0/CMDS/dsave dsave
Copy #30K /d0/CMDS/dump
   dump
```

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```
Copy #30K /d0/CMDS/echo echo
Copy #30K /d0/CMDS/edit edit
Copy #30K /d0/CMDS/exbin exbin
Copy #30K /d0/CMDS/FORMAT FORMAT
Copy #30K /d0/CMDS/free free
Copy #30K /d0/CMDS/ident ident
Copy #30K /d0/CMDS/link link
Copy #30K /d0/CMDS/list list
Copy #30K /d0/CMDS/load load
Copy #30K /d0/CMDS/login login
Copy #30K /d0/CMDS/makdir makdir
Copy #30K /d0/CMDS/mdir mdir
Copy #30K /d0/CMDS/merge merge
Copy #30K /d0/CMDS/mfree mfree
Copy #30K /d0/CMDS/os9gen os9gen
Copy #30K /d0/CMDS/printerr printerr
Copy #30K /d0/CMDS/procs procs
Copy #30K /d0/CMDS/pwd pwd
Copy #30K /d0/CMDS/pxd pxd
Copy #30K /d0/CMDS/rename rename
Copy #30K /d0/CMDS/save save
Copy #30K /d0/CMDS/setime setime
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Copy #30K /d0/CMDS/sleep sleep
Copy #30K /d0/CMDS/tee tee
Copy #30K /d0/CMDS/tmode tmode
Copy #30K /d0/CMDS/tsmon tsmon
Copy #30K /d0/CMDS/unlink unlink
Copy #30K /d0/CMDS/verify verify
Copy #30K /d0/CMDS/xmode xmode
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Copy #30K /d0/CMDS/ew.format.gen ew.format.gen
Chd ..
Makdir SYS
Chd SYS
Copy #30K /d0/SYS/errmsg errmsg
Copy #30K /d0/SYS/password password
Copy #30K /d0/SYS/motd motd
Chd ..
Makdir DEFS
Chd DEFS
Copy #30K /d0/DEFS/OS9Defs OS9Defs
Copy #30K /d0/DEFS/RBFDefs RBFDefs
Copy #30K /d0/DEFS/SCFDefs SCFDefs
Copy #30K /d0/DEFS/SysType SysType
Chd ..
Copy #30K /d0/startup startup
unlink copy
tmode .1 pause
```

Close inspection of this listing shows that it is a procedure file that contains every command needed to make a new copy of the backup of the system disk in drive /D0 on the disk you have in drive /D1. So, the procedure file changes the working data directory to /D1 and executes the procedure file /D1/makecopy. All you need to do at this point is sit and watch. OS-9 will make all the directories it needs and copy all the files you—or rather DSAVE — has told it to. After OS-9 finishes with the procedure file, /D1/makecopy, it returns to the next line in the original procedure file, /D1/install.2, which tells it to delete the evidence in the file makecopy. It then uses TMODE to restore the current standard output path to its original condition, turns off the echo of lines input to the SHELL and exits gracefully. You have a brand new disk file which contains a new OS9Boot file that you have designed.

Use these listings as an example when you design your own procedure files. They work and work well. Please note that you won't want to put an asterisk in the first column of the DELDIR /D1/MODULES, DEL /D1/bootlist, /D1/makecopy and DEL /D1/makecopy command lines in the file "install.2" when you actually run the procedure.

Once you type the name of your procedure file the operation of the computer is taken care of automatically by OS-9 — if you have done your homework and written the procedure properly.

After writing this tutorial I asked Bill Ball, of Dale City, Va., Coast Guard Headquarters carpool fame, to take a look at it and see if he understood the process. He did. But, he suggested that I show you how to write a procedure to build a modified system disk of your own. Why not?

In this example we will assume that you want to save an updated "CCDISK" module and add the modules DIR, MDIR, MFREE, and LIST to your present OS9Boot file. We will also assume that you have run the procedure "changedisk" from our April column in your start-up file. In other words, when you run the procedure we are describing now, CCDISK will have already been modified in memory. However, we will not assume that you have verified its CRC.

First insert your OS-9 system disk into drive /D0 and boot the system normally. Now, use the BUILD utility command or your favorite editor to enter the following procedure in a file named /D0/makenewsys. Also enter the list of modules you want to be in your new OS9Boot file into a file named /D0/bootlist.

After entering "makenewsys" and "bootlist" run the procedure by typing:

```
OS9: /D0/makenewsys
```

```
t
tmode .1 -pause
format /d1 </term
makdir /d1/MODULES
chd /d1/modules
save ccdisk.temp ccdisk
verify U <ccdisk.temp >ccdisk
del ccdisk.temp
load save
save ccio
save term
... etc.

(* At this point, save each module that is in
(* memory that you want to put in your new OS9Boot file.
(* Do not save the modules you don't want to include, but
(* make sure that you do include all modules that must be present.
(* After saving all the required modules to files, then continue.

os9gen /D1 </D0/bootlist
unlink save
deldir /d1/modules
d
del /d0/bootlist
chd /d0
dsave -s30 /D0 /D1 ! shell
tmode .1 pause
-t
```

Below is a snapshot of your "bootlist" file. Notice that since the modules, DIR, MDIR, MFREE and LIST are already in files in your /D0/CMDS directory, you don't need to load them into memory and save them in /D1/MODULES. You can let OS9GEN load them from the directory /D0/CMDS. You must however, give OS9GEN the complete pathlist to the file since your current data directory is set to /D1/MODULES when you run OS9GEN.

Finally, remember that each and every module that you want in your final OS9Boot file must be in a file that is named in the list of filenames in "bootlist." And conversely, all modules that you want removed from your OS9Boot file must not be in the list.

ccdisk
ccio
term
...
/d0/cmds/dir
/d0/cmds/mdir
/d0/cmds/mfree
/d0/cmds/list

... etc.

OS-9 Seminar Update

We've received some more information about the schedule at the Third Annual OS-9 User Seminar scheduled for August 17-20. First, registration will be held from Noon to 5 p.m. on Friday, August 17.

Exhibit Hall
Noon to 5 p.m., Friday
9:00 a.m. to 6:30 p.m., Saturday
Noon to 5:00 p.m., Sunday

Seminars
9:00 a.m. to 5:00 p.m., Saturday
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Other Events
Cocktail Reception: .... 6:30 p.m., Friday
Buffet Dinner:............. 7:30 p.m., Friday
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Users Group Meeting: .... 6:30 p.m., Saturday
Brunch: ....10:00 a.m., Sunday
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Discussion: .... 9:00 a.m. to 2:00 p.m., Monday
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Open House: ....2:00 p.m. to 5:00 p.m., Monday

The seminar will be held at the Des Moines Marriott Hotel, 700 Grand Ave., Des Moines, Iowa. Registration is $125. The deadline for payment and return of registration form is August 4. Microware has arranged with the Marriott for a special room rate of $64 for single or $74 for double occupancy. Since the Iowa State Fair is underway in Des Moines that week you should plan on making reservations early.

If you're just learning OS-9, the roundtable technical sessions will be a blessing for you. They will cover just about every aspect of the design and use of all Microware software. Of course, that means all Radio Shack OS-9 software. At the sessions you will be able to ask questions of the people who wrote the software. Another added benefit of the Seminar is the chance to meet and swap notes with other OS-9 users. If you make your living in this business, this seminar is an outstanding investment. Hope to see you there!

A Surprise From Radio Shack

We received some good news from William D. Smith of Port Elgin, Ontario. It seems he just bought a new Radio Shack disk drive March 30. It was one of the new drives in a white case (Cat. No. 26-1161) and appeared to be about a quarter inch shorter than the old silver colored drives. It was also marked "Made in USA" and Bill noticed that it sounded like a Tandon drive. This aroused his curiosity and he changed the OS-9 device driver and found that his new drive had 40 tracks and would step at six milliseconds. In his words, "having 90 extra sectors is very useful."

Bill asked another question that deserves mention. He quoted Frank Hogg's February "hogg_wash" column that recommended removing the Piper, Pipeman and Pipe modules from your OS9Boot file and wanted to know how to do it.

My answer! Don't! Without these modules you won't be able to use any of the "software tools" piping concepts we have been describing in the past several months. This concept is one of the most powerful features of OS-9. To remove these modules would be "hogg_wash." More on that subject later.

More Exciting News

Dan Johnson dropped me a line last week to let me know about two new features that are now in SDISK — his replacement to Radio Shack's CCDISK module. Dan has added "getstt" and "setstt" functions to the driver. This means that you can go out and read or write any individual sector on a disk regardless of the format of the disk or the number of bytes in a sector. He put the feature in because one of his customers had the need to read and write disks for an IBM PC. Of course, with an assembly language program written to use these new functions you could also read and write to a CP/M disk, etc.

The SS.DREAD function (function code $80) reads a specified sector into a buffer. Double density sectors may be any length. Single density sectors must be either 128 or 256 bytes long. Here's a look at the 6809's registers before and after a call.

On Entry:

A = path number
B = $80
U = track number (MSB) / sector number (LSB)
X = address of buffer where you want to store the data
Y = single density size / FMT

A Closer Look at Y-Register:

bit 0 = side (either 0 or 1)
bit 1 = density (0 = single, 1 = double)
bit 2 = track per inch (0 = 48 TPI, 1 = 96 TPI)

Exit Conditions:

Buffer contains data read from sector.

Carry bit of CC-register is set if there is an error and the error code will be in B-register.

Another function named SS.DWRIT is used to write directly from a buffer in memory to a sector on the disk. Set up of the registers for this call is similar to that for SS.DREAD.

Johnson also mentioned that the LS utility in his Hackers Kit #1 contains a "-C" option that lets you confirm each matching name. It works like this. If a name in the directory matches all the criteria it is listed to the terminal via the standard error output path. At this point if you type a 'Y' the name will be sent out the standard output path. If you type any other letter, LS will discard the name.

And Yet More Software Tools

When we visited Louisville in early April for a Coast Guard On Scene Coordinator/Regional Response Team Hazardous Chemical Response exercise we had the pleasure of touring THE RAINBOW offices and plant. We also saw Dan Downard and picked up our review copy of Computerware's new OS-9 *Disk Fix and Utilities.*

This is a comprehensive package that contains two major parts. The first part gives you a package of six handy utilities designed to make OS-9 operation easier. The second is a new device driver named *CCDisk* which is designed to replace the original *CCDISK* module. Let's look at the utilities first.

DirCopy is a very versatile backup program that lets you copy one disk to another, even if the formats are different. Among other things, this utility lets you confirm the copying of each file, lets you copy sub-directories, presorts the directory you are copying into alphabetical order and updates the file owner's number.

Patch gives you the ability to inspect and modify any file on a disk. This is a utility that would come in handy when you need to change the value in a device descriptor in your OS9Boot file without rebuilding it. It's also handy when you want to change the default data area requested by a program. It even has a special Validate command built in which lets you restore the header checksum and module CRC when you change a file. This is absolutely essential because when a module's CRC is incorrect, OS-9 will refuse to execute it.

FileLook displays the size, type, revision number and name of all modules in a disk file. Its report looks a lot like that of an MDIR E. The information it returns is very close to that provided by the Radio Shack *Ident* utility.

Compare lets you compare a module in memory to a module stored in a disk file. When there are differences, it will

RAINBOWfest Chicago

Seminar Program And Speakers

Ed Juge — **Keynote Speaker**

Ed, director of market planning for the Tandy Corporation, will be our keynote speaker at RAINBOWfest's "CoCo Community Breakfast."

Frank Hogg — **Advanced Operating Systems**

Frank is the president of Frank Hogg Laboratory and a forerunner in FLEX and OS-9 systems.

Richard Parry — **Music Synthesis**

Richard is the founder and owner of Speech Systems and is the designer of music and speech synthesizers.

Linda Nielsen — **Women And Computers: How And Why**

Linda, of Moreton Bay Laboratory, and several others active in the CoCo area, will lead a discussion on women's involvement in computing in general and the Color Computer in particular.

Jim Reed — **Writing For RAINBOW**

Jim, managing editor of THE RAINBOW, will talk about how you can submit programs and articles to magazines for fun and profit. He is also senior editor of PCM — The Magazine For Professional Computing Management.

Michael Plog and Charles Santee — **Improving Educational Software**

Michael Plog is an education writer for THE RAINBOW and an educational researcher in addition to being a major partner in the Center for Opinion Research.

Dr. Santee is an education writer for *Hot CoCo* and has published poetry and curricular as well as statistical and educational software (including *CCM#3* for JARB Software). He is a recipient of several grants and awards for educational technology.

Dale Puckett — **Beginners Tour Of OS-9**
Beginners Tour of BASIC09

A free-lance writer and programmer, Dale has worked with microprocessors since 1976 and has just completed his first book, "The Official BASIC09 Tour Guide." Dale will be available to sign copies of his book at RAINBOWfest.

Dan Downard — **Machine Language For The Beginner**

Dan Downard is the technical editor for THE RAINBOW and an electrical engineer. He has been involved in electronics for 24 years through ham radio (K4KWT). His interest in computers began about five years ago and he has built several 68XX systems.

Ken Kaplan — **Secrets Of OS-9**

Ken is president of Microware, the developers of the OS-9 Operating System.

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RAINBOWfest

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For the 1983-84 season, we scheduled four **RAINBOWfests** in four parts of the country. If you missed the **RAINBOWfests** in Fort Worth on Oct. 14-16, Long Beach on Feb. 17-19, and at New Brunswick on March 30-April 1, you still have time to make plans *now* to attend our Chicago show. It will offer fun, excitement, new products, seminars and information for your CoCo!

Our Chicago show will be held at the Hyatt Regency, Woodfield, which offers special rates for **RAINBOWfest**. The show will open at 7 p.m.-10 p.m. Friday, run 10 a.m.-6 p.m. Saturday and close with an 11 a.m.-4 p.m. session Sunday. It will have a CoCo Community Breakfast featuring an outstanding national speaker from the Color Computer World. And the exhibition will be interspaced with a number of seminar sessions on all aspects of CoCo — from writing in machine language to making your BASIC work better.

But most of all, there will be exhibitors. Lots of them. All ready to demonstrate products of every kind. Some with special programs and hardware items to introduce. Others with show specials.

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Dmode lets you modify the device descriptors used to identify your disk drives, making it easy to access additional features available on many drives. You can set the descriptors up for one or two-sided drives, 6-, 12-, 20- or 30-millisecond stepping rate, up to 40 tracks per side. You must be using Computerware's new *CCDisk* to take advantages of these changes however.

NewFmt is a replacement for the original Color Computer OS-9 format command that lets you create new single- or double-sided disks containing one to 40 tracks. This utility is interactive and will let you determine the format of the disk before you execute the command.

CCDisk comes with a file that contains a script of Shell commands that will automatically generate a new system disk for you. The new disk will have Computerware's *CCDisk* in the OS9Boot file. Since they supply the command file for you, the work is done and installation is a snap.

Another Hidden Secret

Kenneth Graham of Tallahassee, Fla., likes to examine code. Just recently while he was studying the OS-9 DUMP utility he made a discovery that will pay off for all of us that print a dump of various files. Try these new command line options he found buried in the code. Thank you, Ken.

```
OS9: chd /d0/cmds
OS9: dump dir >/p
OS9: dump -h list >/p
OS9: dump -l mdir >/p
OS9: dump -l -h dump >/p
```

Dundon's 68XX(X) Newsletter Is Pro OS-9

If you live in the great northwest you may be interested in Dick Dundon's newsletter. The past several months he has taken a very strong stand for OS-9. He gives you a lot of local club news and carries small advertisements for vendors in that area. The subscription rate is $7.50. Write him at P. O. Box 5282, Kent, Wash., 98064.

Making A File That Will Boot With Hires

Carlo Segre, from the Physics Department at the Illinois Institute of Technology, writes to warn those of you who have visions of making a boot disk with Hires from FHL's *O-Pak* installed. Seems he tried to COBBLER it several times and just couldn't make things work.

Here's the problem. Hires modifies memory in the CCIO module. To make a disk that would boot properly with Hires you would need to use OS9GEN. You would need to save the CCIO module to a disk file after Hires has modified it to a temp file. Then, you would need to verify it and put it in the boot list you feed OS9GEN. Haven't tried it but I'm sure it will work.

Random BASIC Explored

We had a chance to take a real short look at Computerware's *Random BASIC*. I ran the benchmark program we wrote about last month on this package as a first test. *Random BASIC* executed the Benchmark Program 7 in 100 seconds. This compares with 204 seconds on the old Southwest Technical Products 8K BASIC or eight seconds on a CoCo running BASIC09. This comparison shows you how much the pre-compiled I-code speeds up BASIC09.

I ran several of the graphics programs Computerware supplied with the release disk and was impressed. People who have been running *Random BASIC* for

Marshmallows for your CoCo

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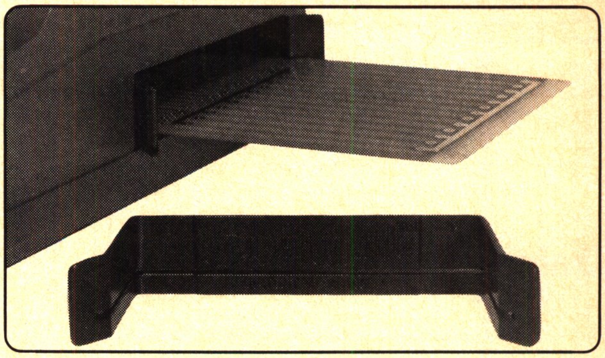

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years with the FLEX operating system who want to carry programs over to OS-9 will be the prime market for this package. Another prime user will be businesses who want to run Computerware's fine business package. It is written in *Random* BASIC. We'll try to point out some more of this BASIC's OS-9 unique characteristics in a future column.

PC-Pak From PBJ, Inc.

As we mentioned earlier in the introduction to this month's tutorial we now have PBJ's *PC-Pak* installed and running well under CoCo OS-9. *PC-Pak* gives you a parallel printer interface and a real time clock in one small cartridge. The Clock is very accurate, unlike the software clock which comes with OS-9 from Tandy. The software clock loses time quite often because interrupts are inhibited every time a disk is accessed. And, the clock works by counting interrupts. The clock in the *PC-Pak* is a MM58167 from National Semiconductor which boasts a four-year calendar. *PC-Pak* contains a battery that runs the clock chip when power to your computer is off.

PC-Pak is a snap to install because of the "install" files supplied by PBJ. The software, written by Ed Bender, is solid as a rock and operation is like magic. It is really nice to see OS-9 come alive on the CoCo and not stop and ask for the date and time.

OS-9 Utilities From JBM

For months, I've been seeing the ads in THE RAINBOW and other magazines from the JBM group in Bridgeport, Pa. "Save the life of your project, operate with the proper tools," they say. The ads never described the tools so my curiosity finally got the best of me. I gave them a call. A few days later I received a *big* box from United Postal Service. This project is going to take awhile, but I hope to be able to describe some of the JBM tools in coming months. Included in this toolbox are a number of BASIC09 and assembly language packages ranging from ISAM, an Index Sequential File Access system and SORTC, a full record disk sort package to look-up, a directory searcher that uses wildcards. This project should be a lot of fun.

More About *Ninecom*

Last month we told you that Microware was coming out with a new communications program called *NineCom*. Since writing that column, we have received a copy of the standard OS-9 version and have used it many hours on Compuserve's OS-9 SIG. Jeanne Kaplan tells me that Microware should be ready to ship the Color Computer version by the time this column hits the stands. *NineCom* seems to be just what the doctor ordered for OS-9 users who want to download information from the many databases and timesharing computers that are on line now. It is almost too easy to use. To run *NineCom*, you simply type:

```
OS9: ninecom /t1
```

The program comes up in the communications mode after telling you that you are on line. You may escape to *NineCom*'s menu at any time by typing a [Control] [Z]. From the menu, you have a number of choices and a snapshot is worth a thousand words.

> *"Every time I fire the CoCo up to test some new software tools or run some experiments, I lean back and stare in amazement."*

C - Uppercase only lock on/off
D - Download file from remote system
F - Full Duplex mode (Keyboard echo off)
H - Half Duplex mode (Keyboard echo on)
R - Return to Communications mode
S - Run OS-9 Shell Command
U - Upload File to Remote System
Q - Quit NineCom Program
? - Display Help Menu

NineCom works well on my Level II system and I have no problems running at 1200 Baud. It has a few more bells and whistles that allow you to define and use special function keys on your terminal. Unfortunately, the page that tells how to use them was missing from my manual. Microware has mailed a replacement manual to me and I'll pass this information along in a future column.

And Finally, Re: hogg_wash

Okay, Frank, who are you trying to kid. FLEX is a fine operating system. We both used it for years. But, you and I both know that OS-9 runs circles around it. Which operating system do you run in your office? How many girls are on line typing at a time?

You seem to imply that it is impossible for the beginner to understand OS-9. I don't think so. All we need is to foster a sense of adventure and experimentation and we'll have the world running OS-9.

Let's face it Frank, you were just plain exaggerating. How can you advise readers of your column to remove PIPE, PIPER and PIPEMAN? How can you tell them that multitasking is impossible on the Color Computer because there is not enough memory? I have run three or four processes at the same time on the CoCo with little difficulty. True, there are certain things you just cannot do because of the "bit banging" hardware design. Yet, for everything you can't do there are nine things you can do.

Granted, memory is limited, but I wrote an entire book using *DynaStar* on a Level I OS-9 system with 56K of memory. You actually get a few thousand bytes *more* on a CoCo. And, half the time I was working, my daughter was busy doing her journalism homework on another terminal. She was running the same copy of *DynaStar* and we both had enough memory to get our work done quite efficiently.

My family uses the CoCo a lot. And when they are doing word processing they are running OS-9. I am hearing no complaints.

Everytime I fire the CoCo up to test some new software tools or run some experiments, I lean back and stare in amazement. It's really unbelievable that an operating system with the power and elegance of OS-9 can run on a $210 plastic box. I'm both amazed and impressed.

Frank, maybe you better rethink your position regarding OS-9. The software developers are coming out of the woodwork. And, I'll bet Tandy is working on improving the hardware. They wouldn't dare put more "bit banging" hardware on the market. An ACIA will bring them up to speed with the rest of the world. A new graphics chip will be frosting on the cake. The future is here now and most of it is running on CoCo OS-9. To be anything but optimistic is "hogg_wash!"

That's all for this month. Here's hoping we'll see you in Chicago.

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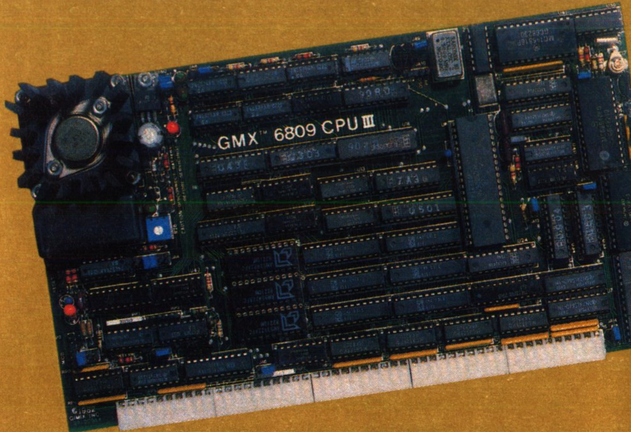

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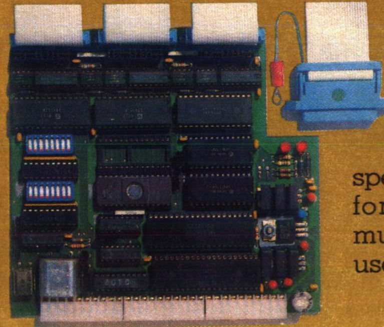

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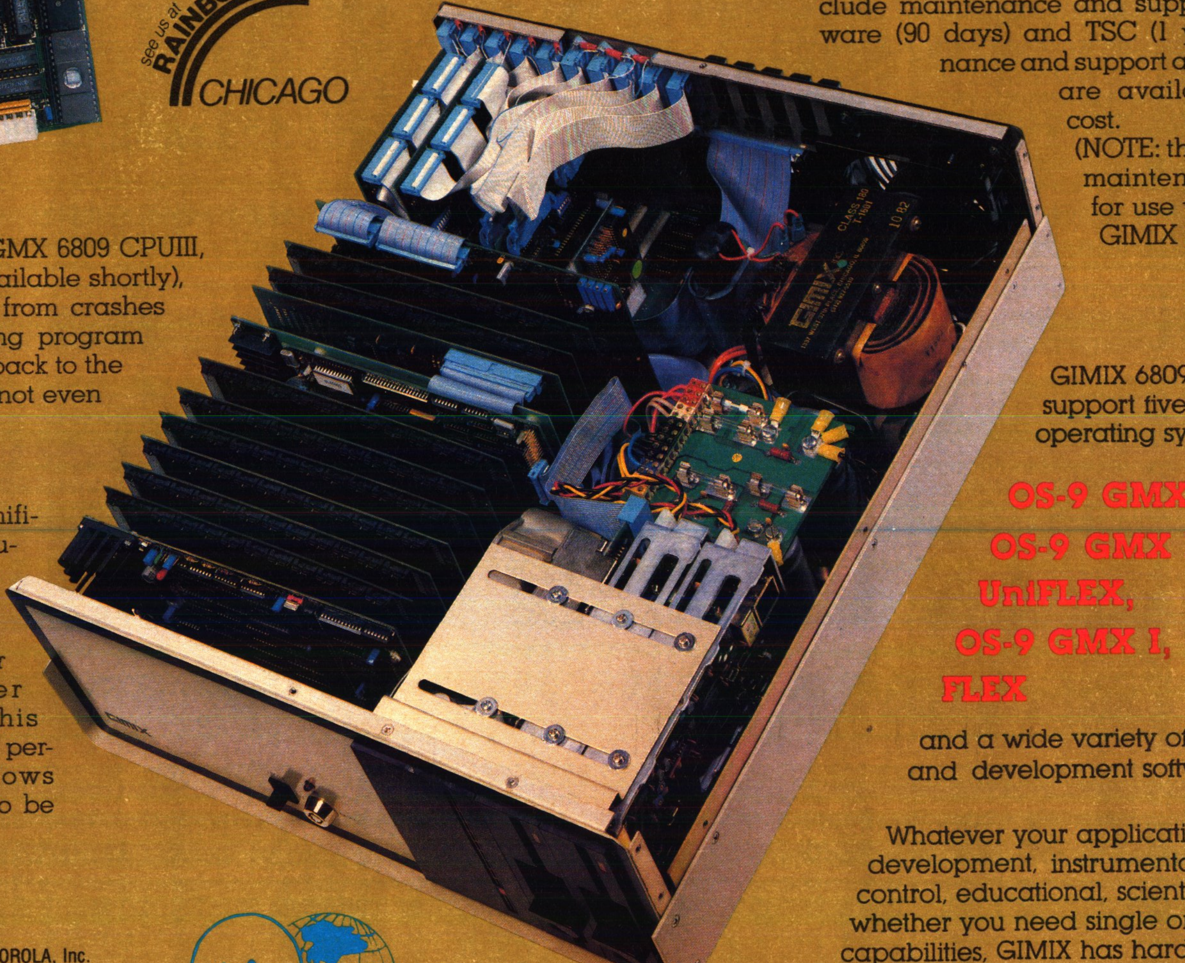

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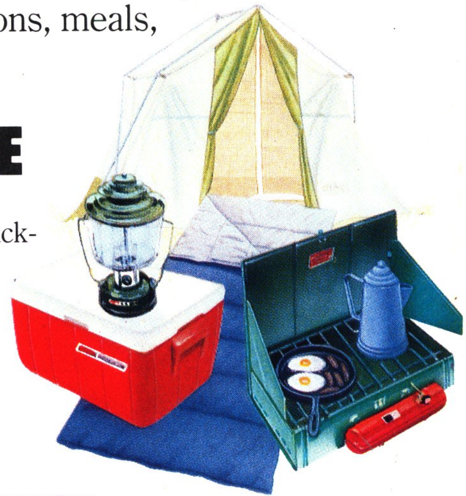

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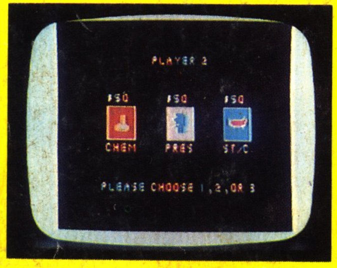
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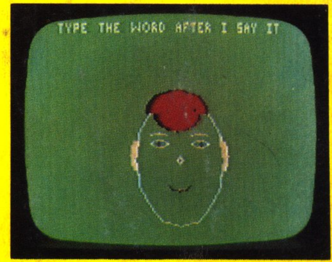
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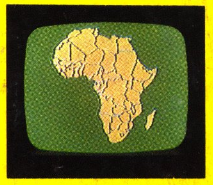

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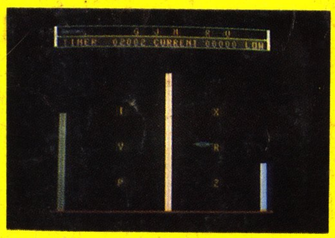
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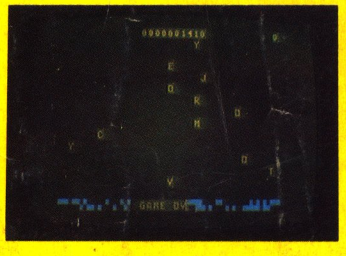
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